THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. JUNE 27, 1895. CHICAGO, ILL. NUMBER 26.

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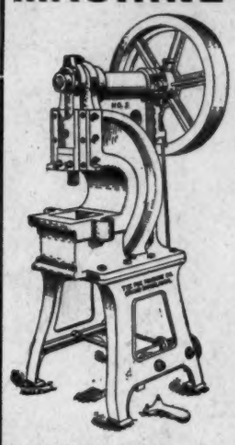

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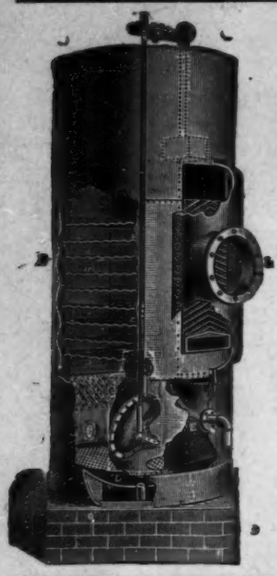

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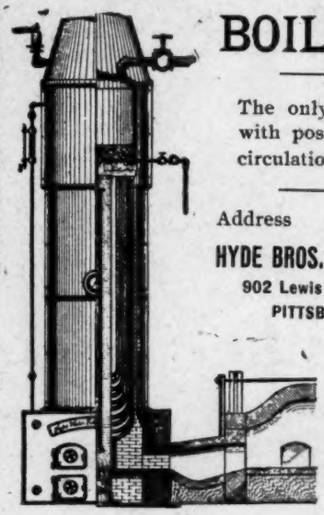

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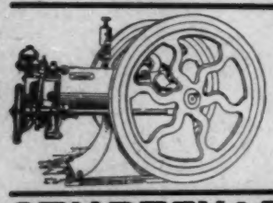

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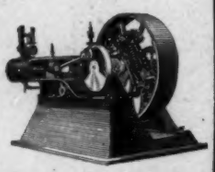

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THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. JUNE 27, 1895. CHICAGO, ILL. NUMBER 26.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The advance in iron and steel is gaining momentum every week, and while there is no concealment of the fear that things may be moving too rapidly for the health of the trade, nobody seems to be seriously trying to hold the market down. With their product engaged from 60 days to six months ahead, and inquiries and orders steadily growing, the mills and steel works are swinging along toward a condition that now lacks only a few of the elements of a boom. They are busier, meantime, in turning down orders that cannot be filled, than in figuring about the sources of the demand or trying to determine how long the present rate will keep up. The call for structural material that has been more and more a figure in steel consumption the past few months reached such a point in the present market week that the leading producers put up prices $3 a ton, making 1.45c the minimum on beams and channels. The Manhattan Elevated contract amounting to upwards of 30,000 tons was placed in the week and went to Pittsburg. The advance in steel rails, from $22 to $24 Eastern mill, decided on at New York last week has already been followed by buying. The Old Dominion line's contract for 10,000 tons went to Pittsburg and some Central Western buying of lesser tonnage is reported. While it is true that new orders for rolling stock are just now a small factor, every week has brought its quota of rail buying and the record has far outrun that for the first half of '94. Much more is known to hinge on the story the next two months tell as to the crops. Prospects in this direction are more flattering with every week. In primary markets the past week has uniformly brought increased strength. Not only is the entire standard Bessemer product of Lake Superior iron mines for 1895 sold, but non-Bessemer ores of good record have been in such demand that 10 and 15-cent advances have been made on the limited stocks yet available of the 1895 product. In pig iron, the marking up of prices North and South has scarcely checked buying, but it has tended to keep the business of Northern furnaces, at least, nearer home. Valley furnaces are letting the New England market alone and the debatable ground in which Southern and Northern furnaces have heretofore had their sharpest contests is greatly restricted. Bessemer pig has gone to $13 Pittsburg, and heavy sales were made in the early part of the market week at $12.25 in the valley or $12.90 Pittsburg. Furnaces are now asking $12.50 and higher in the valley, and some have withdrawn from the market. Steel billets continue their upward march. Sales for the third quarter were made at $20 and $20.25 Pittsburg, and a spot delivery sale is reported at $20.50. In the Cleveland market there is practically nothing quotable. The meeting of the Merchant Bar Iron Association at Chicago, adjourned without action on prices. At Pittsburg steel bars have advanced to 1.35c flat, or to 1.20c @ 1.25c with the extras provided in the new list recently agreed upon there. Plate mills are driven with orders, and still there is no diminution in the volume. Ship work furnished a good tonnage in the Cleveland district, and Chicago has taken a second contract for delivery at Newport News.

THE CLEVELAND DISTRICT.

An advance in non-Bessemer ores, anomalous as it sounds, has been a feature of recent transactions in this market. The tonnage involved in these sales at higher prices is not large compared with the totals sold earlier in the season, but one well-known Menominee non-Bessemer brought $2.25 as against $2.10 a month ago, and in the case of a few other ores in the non-Bessemer list a 10 cent advance was obtained. While there are plenty of non-Bessemers on the docks, they are not so placed as to be available for Eastern shipment, and for that reason direct ore is necessary as well as for the additional reason that Eastern buyers must save the margin given them by direct shipment. Practically all the old range non-Bessemer ore that can be shipped from above this year is now sold and in one or two cases offers for certain ores in this category have been refused. It is worthy of note that a year marked by the establishment in Cleveland of a sales agency for Cuban ores is also distinguished for the largest tonnage of Lake Superior shipments into the Eastern market. The movement of ore from Lake Superior ports continues very heavy and the total by July 1 promises to be a record-breaker. Freights are firm at 55, 75 and 85 from Escanaba, Marquette and Ashland, and the lack of grain movement is all that prevents a stronger Lake Superior rate.

Pig Iron. Several sales of Bessemer pig, one of them 10,000 tons, another 5,000 tons, were made at $12.25 valley furnace within the week, followed a day later by smaller sales at $12.35. The asking price of furnaces willing to sell has been $12.50 in the past few days with no sales reported at that figure. The feeling is strong, however, and at least three Cleveland firms are out of the market for the present, though two have some iron in stock. Most valley furnaces are well sold ahead and the fact that the Mahoning valley steel plant has drawn upon Shenango valley furnaces in recent purchases in evidence of a condition that has not existed before. The foundry furnaces, too, are feeling the influence of Bessemer advances, and all-ore No. 1 iron is now held at $12 in the valley, with $11.50 as the price for No. 2. Weaker furnaces have been strengthened in their views in the past two weeks and buyers find the gaps that have long existed in the selling line quite generally closed up. Forge iron has been stationary at $10.25 in the valley. The coke question has developed somewhat in the past week and the role of the leading interest is likely to be that indicated in these columns last week. It is known that one coke operator, who has been in the way of an agreement on a higher price, is quite well filled up with contracts for the second half of the year at $1.25 and less. The indications are now that the programme at which the largest producer has been aiming, namely, to advance the price to $1.50 at the oven, will now be carried out. The contracts already taken at $1.35 with a labor clause, would amount practically to the same thing, since any price above $1.35 means an advance in wages. Higher

Continued on page 7.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

The market continues to be very firm and prices, as a rule, have advanced and are stronger all the time. It is quite probable that further advances will be chronicled within the next week. Large sales of pig iron have been made and the situation grows stronger every day. Bars are in large demand and several good sales were made last week. At the present writing, it seems likely that prices will be advanced at the meeting of the Merchant Bar Iron Association, held this week Tuesday in Chicago. Several mills are out of the market and others already require an advance of 5c. on all orders. Rails and billets have been in large request and sales have been very satisfactory. Quotations are advanced all around. Structural material is also selling for more money and the inquiry has not fallen off. Plates, sheets and other classes of material are selling in large quantities, and are higher and firm.

PIG IRON.—Sales of local iron are keeping up well, the last week showing nearly, if not quite as large tonnage closed as that of the week before. Buyers are every week more and more willing to pay the prices asked, and are inclined to the opinion, apparently, that they will be no lower, if not higher, for some time to come. In the past week there has been no advance in quotations, but those made are very firm, and sellers are not inclined to accept orders except they are very desirable, and in not too large lots. Southern iron is in about the same condition, though sales have not been nearly as large as those of local irons. Most Southern furnaces are almost if not quite out of the market, and are only desirous of selling in small lots. A buyer who was in the market for about 10,000 tons of all grades of iron, both Northern and Southern, last week, was obliged to divide his order up among no less than seven furnaces, to secure the iron and deliveries desired. Prices on Southern iron have been stationary, but very firm. Lake Superior Charcoal iron has been in considerably larger demand in the past week, and several good sized sales were made. Prices have been advanced 25c. a ton. Quotations are now made as follows:

Lake Sup. Charcoal	$13 25@13 75	Southern No. 2 Soft	$11 25@11 50
Local Coke Fdy. No. 1	11 75@12 00	South'n Silveries No. 1	12 75@13 00
Local Coke Fdy. No. 2	11 25@11 50	South'n Silveries No. 2	12 25@12 50
Local Coke Fdy. No. 3	11 00@11 25	Jackson Co. Silveries	15 00@16 00
Local Scotch Fdy. No. 1	11 75@12 00	Ohio Silveries No. 1	14 00@14 50
Local Scotch Fdy. No. 2	11 25@11 50	Ohio Silveries No. 2	13 00@13 50
Local Scotch Fdy. No. 3	11 00@11 25	Ohio Strong Softeners	13 00@13 50
South'n Coke No. 2	11 50@11 75	Alabama Car Wheel	16 50@17 00
South'n Coke No. 3	11 25@11 50	Malleable Bessemer	12 00@12 50
Southern No. 1 Soft	11 50@11 75	Coke Bessemer	12 00@12 50

BARS.—The sale of bars has been large, and a number of good orders were closed, among them one of 1,200 tons, one of 600 tons, and several nearly as large. A number of the mills are entirely out of the market, and others are asking an advance of 5c. over the quoted prices made by the association. A meeting of the Bar Iron Association will be held in Chicago on Tuesday of this week, and it seems likely that prices will be advanced then. Inquiry continues large, and it is likely that several good contracts will be closed in the present week. Quotations are now made as follows: Common iron, 1.20c. to 1.30c.; guaranteed iron, 1.30c. to 1.40c.; soft steel bars from strictly billet stock, 1.35c. to 1.40c.

RAILS AND TRACK SUPPLIES.—Orders closed have been fully up to the expectations of the mills, and the inquiry is growing larger every week. In the past week quotations were advanced $2 on rails, and are now as follows: Rails, $25 to $27; splice bars, 1.35c to 1.40c; track bolts, 2c to 2.05c; spikes, 1.80c to 1.90c.

BILLETS AND RODS.—About 8,000 tons of billets were sold in the past week, at prices ranging from $20 to $21, and quotations have been advanced by the local mills to $21 to $22. Sales of sheet bars amount to 2,000 tons, ranging in price from $23 to $23.50. These have also been advanced to $24 to $25. No sales of rods are reported and they are quoted at $27.50.

STRUCTURAL MATERIAL.—The only large order placed last week was for the material for the Studebaker building, requiring about 900 tons. An order for 1,700 tons for the Winnebago building is in the market, and will be given out, probably, this week. General business is growing larger all the time, and prices have been advanced. Several of the mills are entirely out of the market on certain shapes, and it would be a very hard matter to obtain any large quantity of universal plates. Quotations are now made as follows: Beams and channels, 1.70c to 1.80c; angles, 1.60c to 1.70c; plates, 1.75c to 1.85c; tees, 1.75c to 1.85c. Small lots from stock are quoted at from ¼c to ½c higher.

PLATES.—A sale of 1,000 tons of ship plates was made by the local company, to go to Newport News. Other large sales were also made, and the aggregate tonnage closed was quite a little larger than that of the week previous. An inquiry has been received for a lot of over 1,000 tons of tank plates for use in 600 hopper cars, the contract for which was taken last week by a Detroit car works. Quotations are made as follows: Tank steel, 1.70c to 1.75c; flange steel, 1.90c to 2c; fire-box steel, 2.10c to 5c.; boiler tubes, 70 and 5 to 67½ per cent discount.

MERCHANT STEEL.—The market is very strong, and buyers are apparently becoming more and more anxious to place their orders. Several good sized season's contracts were placed last week. Quotations are higher, and are now as follows: Open-hearth spring, tire and machinery steel, 1.90c to 1.95c; smooth finished machinery, 1.75c to 1.80c; smooth finished tire, 1.65c to 1.75c; Bessemer bars, 1.55c to 1.60c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SHEETS.—Very few of the mills are able to promise anything like prompt deliveries, but demand continues large, and local agents are able to get all the business they want. Quotations are a little higher. No. 27 common iron, 2.60c to 2.70c; sheet steel, 2.70c to 2.80c; galvanized sheets, 75 and 5 per cent discount.

OLD RAILS AND WHEELS.—Consumers are buying more freely, and quite good sales were made last week. Prices are stronger, and are made as follows: Old iron rails $13.75 to $14.25; old steel rails $9 to $9.50 for short, and $11 to $12 for long lengths; old wheels, $11.50 to $12.

SCRAP.—Prices are made very much higher by the dealers, and buyers are taking hold more freely, several large transactions being reported. Quotations are made: Railroad forge, $11; dealer's forge, $9.50; No. 1 mill, $8 25 to $8.75; heavy cast, $8.25 to $8.50; axles, $14.75 to $15; cast borings, $4.75; wrought turnings, $6 to $6.25; axle turnings, $6.75; mixed steel, $8 to $8.25; stove plates, $6; heavy melting steel, $9.50 to $9.75.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. A heavy tonnage of Bessemer pig iron is involved in the transactions of the past week, which have ranged from $12.75 to $13, Pittsburg. The bulk of the business was at $12.25 valley furnace, or $12.90 Pittsburg. Several sales of 10,000 tons each are

reported at figures close to this basis, deliveries in the second half of the year. These are further inquiries for metal but furnaces seem to be stiffer in their views and some are not in the market. The feeling grows stronger with every week and the advances are more numerous. Billets have been more active than in the preceding week. A sale of 5,000 tons, deliveries in the third quarter, is reported at $20, maker's mill, a sale of 4,000 tons at $20.25, and a sale of 1,000 tons, June delivery, at $20 50. The largest steel maker here is now out of the market having no billets to offer for the third quarter. The situation is very firm and the advances in all steel products, particularly in nails, are supporting billet advances as fast as they are made. The capture of the big contract for the Manhattan Elevated, New York, has filled up certain departments of the largest local structural mills for several months and an advance of $3 a ton, or from 1.30c to 1.45c, was made June 20 in beams and channels. The output of this material in May and June has been the largest in local mills for any two months on record. The advance in rails of $2 and in angle bars of $4 in the past week is in response to a constantly increasing demand from railroads, and so far as local mills are concerned, orders for rails and track supplies have been quite satisfactory. In fact the past week has shown activity in nearly every line of finished material that is unprecedented for the closing week of June. The advance in skelp has been steady and the higher prices for wrought pipe recently established are being well maintained. The meeting of wire nail manufacturers last week developed considerable difference of opinion as to the size of the advance to be made, but the advocates of a $1.50 Pittsburg price carried the day. This is the car-lot price for July, with a reduction of 10 cents on 1,000-keg orders. The sheet mill and tin plate scales were settled in conference without serious friction, the rates now in force being continued, but the basis being changed from 1.1c bar iron to the average price of Nos. 26, 27 and 28 gauges in the case of sheets and to the ratio between billets and IC plates, 100 lbs., for tin plate. These settlements insure a continuous operation of the mills. The local iron manufacturers have met the Amalgamated Association committee, but there are no scale signatures yet and will not be until after the meeting with valley manufacturers at Youngstown. Old material has been advancing week by week. We hear of a sale of 1,000 tons of old iron rails at $15 and one of 2,000 tons at $15.50. Forge iron for July and August delivery has sold at $10.65 and $10.75 the past week.

Cincinnati. The upward trend of the iron market continues, and apparently, without any retarding influences worth noticing. Agricultural implement makers in the Central West complain of cancellation of orders, mainly because of the drouth through Ohio, Indiana and Illinois. In some other lines also, disappointment is expressed, but it is perhaps more because high expectations have not been realized, than that there has been no improvement. Reviewing the salient points that the week has developed, one of them is the disappearance of accumulated stocks of iron that were pressing on the market, and of small, weak sellers. One lot of 30,000 tons of foundry iron at a Northern furnace, that has depressed prices in its district, is reported to have all been taken. One Southern furnace that has been taking contracts considerably below the market, is reported to have filled its books uncomfortably full of orders. Even the large stocks of charcoal iron that have so competed against each other as to drive prices out of sight, have been largely taken up, and the holders have discovered how foolish they have been to part with valuable property at less than cost. Charcoal irons are still the weakest spot in the market, but they are daily strengthening. The principal transactions of the past week have been with two or three large agricultural implement concerns, and with the leading malleable works. The latter have covered for a total of perhaps 25,000 tons. The majority of it is coke iron; but a considerable portion has been of charcoal iron. The rolling mill and general foundry trade have been rather free buyers, and all at the last advance in prices. Southern irons are now $1.75 per ton up from the lowest figure on mill grades, and $1.50 on foundry grades. The strongest element in the whole situation appears to be Bessemer pig and its products. Steel billets, even at the outside figure, are hard to obtain. There has been practically no demand from the car works, or from other industries dependent upon the railroad business. The market is practically made without any help from the railroads.

St. Louis. Another advance of 50 cents a ton on Southern iron, which was ordered June 15, shows the increasing strength of the market. The present prices of pig iron, including the last advance, are lower than in June, 1893, when there was such a depression in trade and values of iron products were then considered at low ebb. The demand is entirely normal and the advance results from reduced stocks and increased confidence in the future.

Buffalo. The Eastern field is beginning to catch some of the spirit which has been in evidence in the Central West for two or three weeks past, and the market is quite active with an advancing tendency. Heavy sales by Lake Superior charcoal fuanaces have reduced the unsold stock to such an extent that an advance of 50 cents per ton has been made, which is the first advance recorded so far in Lake Superior charcoal iron. It is still very low, however, and if the next week shows as large a demand as the last one, it will undoubtedly be reflected in future prices. The advance really only brings these irons on a plane with Bessemer at most of the competing points and they still remain the cheapest thing, relatively, in the market.

Cuban Ore Handled in Cleveland.

The second cargo of iron from the Spanish-American Iron Co 's mines at Santiago de Cuba, is now being unloaded at Philadelphia from the steamer Edenmore. The bill of lading received in the office of Oglebay, Norton & Co., Cleveland, who are sales agents for this ore, calls for "3,000,000 kilograms more or less," indicating a cargo of upwards of 3,000 gross tons. The first cargo, which came about two weeks ago on the Massasoit, consisted of "4,000,000 kilograms more or less," according to the approximate designation of the bill of lading. It proved to contain exactly 4,293 gross tons. The kilogram of the metric system is 2.2036 pounds and the metric ton, which equals 1,000 kilograms, is about 2,204 pounds.

The analysis of samples from the first cargo, made by Booth, Garrett & Blair, Philadelphia chemists, showed iron 63.15, sulphur .049, phosphorus .023, moisture .74. The Spanish-American is a hard ore similar in appearance to the well known hard ores of the Marquette and Vermilion ranges. Some sales have been made to Eastern furnaces and it is expected that in the next few months shipments will be made at the rate of one or two cargoes a week. It is recent practice with a few Eastern Pennsylvania furnaces to use Mesabi ores along with Cuban ores—25 per cent of the former to 75 per cent of the latter.

A. J. SHAW, president of the Shaw Electric Crane Co., is dead at Muskegon, Mich.

THE IRON TRADE REVIEW

DEVOTED TO
IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES, IRON ORE PRODUCTION, TRANSPORTATION, AND GENERAL INDUSTRIAL PROGRESS.
PUBLISHED EVERY THURSDAY BY
THE IRON TRADE REVIEW CO.,
CLEVELAND, OHIO.

CLEVELAND:
27 VINCENT STREET.
A. I. FINDLEY, Editor.

CHICAGO:
1142 MONADNOCK BLOCK.
B. M. GARDNER, Associate Editor and Western Manager.

ENTERED AT THE POST OFFICE IN CLEVELAND, O., AS SECOND CLASS MATTER.

JUNE 27, 1895.

TWO WAGE SCALES SETTLED.

The conferences at Pittsburg on June 19 and 20 between the iron and steel sheet manufacturers and the Amalgamated committee and on June 21 between the latter and the tin plate manufacturers, ended in agreement on both scales. The objection of the sheet manufacturers to a scale that made their base that of the bar mills carried special weight at this time, when the price of bar iron is a matter of agreement among its makers under the thorough organization that has been perfected west of Pittsburg in the past two months. The workers' committee conceded the point after much discussion, and the scale was signed with a base to be determined by the average selling price f. o. b. mills, of gauges Nos. 26, 27 and 28 steel sheets, hot finish, 2½ cents being the minimum. The minimum wage will be the present rate and any advances that may come will be determined every 60 days. In view of the activity in the sheet market of late, this ready agreement is most opportune and ensures a steady operation of the mills throughout the summer months, barring brief shutdowns for changes and repairs.

The conference between the Tin Plate Manufacturers' Association and the Amalgamated committee began at Pittsburg, Friday, June 21, and lasted to an early hour Saturday morning. The main objection raised was the one that delayed agreement in the case of the sheet mill scale. The bar iron base was refused by the manufacturers. The agreement finally reached was upon a base determined by the ratio between the selling price of 4x4 inch steel billets and that of IC 100-lb. tin plates. This base takes account both of the fluctuations in the price of the tin plate manufacturer's raw material and in the price of his product. Both these prices are beyond his control, virtually, the former being decided by the general demand for steel and the latter by the competition of Welsh tin plate works. The scale agreed upon is precisely that which is now being paid, as printed in these columns last week, with one exception. The scale for Morewood stacks, new this year, is changed by striking out entirely the column for assorting. One concern, the MonongahelaTin Plate Co., which is not a member of the manufacturers' association, has already signed the scale. The non-union mills, so far as known, will continue on the present basis.

The bar iron scale is still to be settled. A preliminary conference between Pittsburg iron manufacturers and the Amalgamated committee, was held on Tuesday. Some objections were raised by manufacturers to the new base, as well as to the ratio of increase in the finishing scale, but final action was postponed until after the meeting between the Amalgamated committee and the representatives of the Merchant Bar Iron Association at Youngstown, June 27.

The attitude of the puddlers at valley mills complicates the situation somewhat. At their meeting at Youngstown on Saturday they are reported to have declared for a $4.75 rate. The officials of the association will ask for the $4 rate and no other at the Youngstown conference, and if the threat of the valley puddlers to form an independent organization and to hold out for their rate is carried out, the Amalgamated Association will be put in an embarrassing position. In the new scale it agrees, in the article which appears this year for the first time, "to supply the undersigned company with skilled workmen, within a reasonable time, when desired to operate their works in the departments governed by rates of wages herein contained." If the $4 puddling scale is signed on both sides and the puddlers refuse to accept the rate, will the Amalgamated Association furnish new men to take their places? Or if it fails to do so, will it expect the manufacturers to bring suits for damages or for enforcement of contract, as the workers did in the case of the tin plate manufacturers in the Pittsburg district?

THE ADVANCE IN BESSEMER PIG.

The course of the Bessemer pig iron market in the past 10 weeks is not surprising, when account is taken of the enormous consumption of that metal that has been in progress since the opening of the year. At the beginning of January every steel works in the country had a greater or less stock of Bessemer on hand, the product of its own furnaces. The merchant furnaces in the valleys, most of them running on Bessemer, also had a considerable amount of unsold metal in their yards. Under this accumulation the price was pushed down below cost to many furnaces, and the unprecedented figure of $9.20 at valley furnace, was touched in some of the January sales, while one Pittsburg sale was made at $9.75. In March, the heavy output of the leading Pittsburg producer, due to the taking of a large tonnage of Eastern work, in addition to that naturally tributary to Pittsburg, began to tell upon the accumulation of the last few weeks of 1894, and purchases of Bessemer were made in the open market, amounting to 100,000 tons, one or two other steel makers taking lesser amounts. Then came the sensational advance in coke wages, the establishment of the new basis for ore, and later the higher wages for blast furnace labor.

But these increased costs of labor and raw material were only auxiliary forces. Their part in the advance of $3.25 that has taken place in Bessemer pig is within $1, leaving an increase of more than $2 to be attributed to the fact that a vast deal more Bessemer iron has gone into consumption in the past five months than has been produced in that time. Not only has the surplus on hand Jan. 1 been wiped out, but furnaces are well sold ahead, the strong buyers having come a second and a third time into the market to cover absolute needs, so heavy was the tonnage from their finishing mills. Meantime all the available furnace capacity in the districts supplied with Lake Superior ores and Connellsville coke has been active, and most of it running on Bessemer, though lately the strong demand for forge iron and the revival in the foundry iron trade have diverted some stacks to those products. Outside of a few anthracite furnaces in Eastern Pennsylvania and possibly the

furnaces at Sparrow's Point, there is little likelihood of early additions to the active Bessemer capacity. In the month of May, stocks of coke iron—and far the greater part of it Bessemer—were reduced 80,000 tons. This, moreover, with less than moderate demand from the railroads. What will take place under a new railroad buying movement can only be surmised.

It is certainly not over-stating the possibilities to predict that the present price for Bessemer pig will be held in the months just ahead, provided the next six weeks' developments do not seriously disturb calculations now generally accepted as to corn and wheat.

It is quite well known to-day just where the Bessemer product of the country will be made in the next nine months. Furnaces that have not already contracted for Lake Superior Bessemer ores will not be able to get such ores, beyond amounts that have no significance in connection with the question here discussed. The importation of Cuban ores will be small this year and the destination of most of these ores is well known. The Cornwall supply is taken up by furnaces now active. Eastern concentrates are not a figure under present conditions. While an increase of producing capacity might be a benefit in holding prices from going higher, there does not seem, from the present outlook, any likelihood of reducing the temperature that way.

"THE men want the cut of 10 per cent made in their wages a year ago restored, as prosperity has returned again." So reads a press dispatch about a strike in a Southern Ohio malleable works. But prosperity has not returned again. Some producers are getting more money for current product, and that is being made the ground for demands for increased wages in other lines in which better prices have not been realized. The long accepted maxim in economic discussions, that wages are the first to fall in bad times and the last to rise has been disproved in the present revival. Wages have led the advance. Employes have been given better pay in many instances, because of the faith of their employers that larger demand and better prices will be generally realized in the months just ahead. Blast furnaces and steel works are now getting business that justifies the advance, but many paid it while they were still filling contracts on the low basis of three and four months ago. Foundries have recently paid a 10 per cent advance when they were not putting out a pound of product at a better price than that of last winter. But they are now seeing the beginnings of a betterment that may later make up for higher wages and give them a margin of profit besides.

TWO YEARS of almost unbroken inactivity in the stocks of Lake Superior mining companies have been followed in the past two months by some moderate transfers. In the money panic a few small holders who needed to realize, or who feared the still lower level that was actually reached, let go all or part of their holdings at great sacrifice. And at intervals since, there have been sales by persons who took favorite stocks at a time when they were regarded gilt-edged investments, but whose faith in the future of these stocks had been shaken by the disastrious record and outlook of the market. These transactions have not been numerous, however, from the fact that heavy owners, even of the stronger stocks, were either unwilling or unprepared to increase their holdings. There is little doing as yet in any stocks save those of the stalwart, old-time companies. The Minnesota and Chandler, in view of the showing made at the recent meeting at Duluth, and the demonstration given the capitalists who made the tour of inspection among the Vermilion and Mesabi mines, have led in the late trading, and the advances have been from 20 to 30 per cent. over the lowest point touched in the depression.

ADVANCING prices in all primary products and an expanding volume of business are smothering into indistinctness the silver cry, that is always loudest when industry is quietest.

THE rate war on east-bound freight from Chicago, with its sensational reductions on certain classes of freight, is not a good omen of larger buying by the railroads. Their tonnage has certainly been increasing lately over that of the corresponding month of 1894. Particularly is this true in iron and steel. And in view of this fact it is hard to understand the recent slashing of the rate on iron articles from 18½c, Pittsburg, to 12c from Pittsburg, the valleys and Cleveland to East St. Louis. A through rate of 25 cents to Galveston, as against 51 cents last year, has started a heavy movement of cotton ties nearly a month in advance of the usual time. The slaughter is expected to terminate on the 28th, but meantime the mills have been crowding forward their product at their highest speed.

THE CLEVELAND DISTRICT.—Continued from Page 3.

wages to the Frick Co.'s men means a like advance by other operators, and whether the takers of low-priced contracts have provided against such a contingency remains to be seen.

Finished Material.

The week has been an active one in the Cleveland district. Most noteworthy of the contracts taken was that for 1,700 tons of plates for the Globe Iron Co. A Cleveland steel works got the business at a figure in the neighborhood of 1.30c. Pittsburg mills meantime are maintaining a minimum of 1.50c and on anything on which delivery is guaranteed 1.60c for tank steel has been done in the week. Another requisition for 400 tons for the U. S. revenue cutter just awarded the Globe Iron Co. is expected to follow. On universal plates one Pittsburg mill is sold up to Oct. 1. The advances of the week have included one of $2 a ton on beams and channels, or from 1.35c to 1.45c Pittsburg. On small orders 1.50c is now asked. A bridge order for 400 tons of open-hearth material was placed in the week and bridge works are all well employed. Angles have advanced to 1.35c. Iron and steel pipe and tubing have been marked up again, the new discounts adding 10 to 15 per cent. to the cost. Sheet mills are loaded up with July business, and August contracts are known to have been refused by black plate mills. Bar iron and bar steel preserve their relative positions. On the latter, Pittsburg manufacturers are asking 1.20c@1.25c, with the extras provided in the list adopted last week effective July 1. The Cleveland billet market has been bare of transactions the past week, though considerable comment has been excited by the arrangement by which Chicago billets are to be shipped into Cleveland by water and converted into rods, calling for nearly all the output of a local mill in the second half of the year. Rods have advanced to $27. The conference of bar iron manufacturers and the Amalgamated Association at Youngstown, Thursday, is being watched with interest in view of its bearing on the immediate future of the bar iron market. The T. & O. C. road has bought 2,500 tons of rails the past week.

A PIECE-RATE WAGE SYSTEM.

One of the noteworthy papers read at the meeting of the American Society of Mechanical Engineers at Detroit this week was that by Fred W. Taylor, of Germantown, Philadelphia on "A Piece-Rate System, Being a Step toward Partial Solution of the Labor Problem." It takes up 28 pages in the printed form in which the society's papers are sent out and is an exhaustive and closely analytical treatment of the system of management introduced by Mr. Taylor in the works of the Midvale Steel Co., at Nicetown, Philadelphia, and employed there for the past 10 years with satisfactory results. We give a synopsis of the paper, reproducing some of its paragraphs just as we find them and in other cases giving the substance of the writer's propositions and demonstrations. The system, as Mr. Taylor elaborates it, consists of three principal elements: 1. An elementary rate-fixing department; 2. The differential rate system of piece work; 3. What the writer believes to be the best method of managing men who work by the day. In introducing his paper Mr. Taylor says:

"Elementary rate-fixing differs from other methods of making piece-work prices in that a careful study is made of the time required to do each of the many elementary operations into which the manufacturing of an establishment may be analyzed or divided. These elementary operations are then classified, recorded, and indexed, and when a piece-work price is wanted for work, the job is first divided into its elementary operations, the time required to do each elementary operation is found from the records, and the total time for the job is summed up from these data. While this method seems complicated at the first glance, it is, in fact, far simpler and more effective than the old method of recording the time required to do whole jobs of work, and then, after looking over the records of similar jobs, guessing at the time required for any new piece of work.

"The differential rate system of piece-work consists briefly in offering two different rates for the same job; a high price per piece, in case the work is finished in the shortest possible time and in perfect condition, and a low price, if it takes a longer time to do the job, or if there are any imperfections in the work. (The high rate should be such that the workman can earn more per day than is usually paid in similar establishments.) This is directly the opposite of the ordinary plan of piece-work, in which the wages of the workmen are reduced when they increase their productivity.

"The advantages of this system of management are:

"First. That the manufactures are produced cheaper under it, while at the same time the workmen earn higher wages than are usually paid.

"Second. Since the rate-fixing is done from accurate knowledge instead of more or less by guess work, the motive for holding back on work, or 'soldiering,' and endeavoring to deceive the employers as to the time required to do work, is entirely removed, and with it the greatest cause for hard feelings and war between the management and the men.

"Third. Since the basis from which piece-work, as well as day-rates, are fixed is that of exact observation, instead of being founded upon accident or deception, as is too frequently the case under ordinary systems, the men are treated with greater uniformity and justice, and respond by doing more and better work.

"Fourth. It is for the common interest of both the management and the men to co-operate in every way, so as to turn out each day the maximum quantity and best quality of work.

"Fifth. The system is rapid, while other systems are slow, in attaining the maximum productivity of each machine and man; and when this maximum is once reached, it is automatically maintained by the differential rate.

"Sixth. It automatically selects and attracts the best men for each class of work, and it develops many first class men who would otherwise remain slow or inaccurate, while at the same time it discourages and sifts out men who are incurably lazy or inferior.

"Finally. One of the chief advantages derived from the above effects of the system is, that it promotes a most friendly feeling between the men and their employers, and so renders labor unions and strikes unnecessary. There has never been a strike under the differential rate system of piece-work, although it has been in operation for the past 10 years in the steel business, which has been during this period more subject to strikes and labor troubles than almost any other industry."

After going over the evils of "soldiering," as exemplified in work done by men paid by the day and the antagonism of interests developed in ordinary piece-work system, where the men are repeatedly cut, as they spur themselves up to increased output under the incentive of increased pay, finally settling down to the nursing of a "soft snap," Mr. Taylor finds a basis for harmonious co-operation in these two facts:

"First. That the workmen in nearly every trade can and will materially increase their present output per day, providing they are assured of a permanent and larger return for their time than they have heretofore received.

"Second. That the employers can well afford to pay higher wages per piece even permanently, providing each man and machine in the establishment turns out a proportionately larger amount of work."

The fact at the bottom of the rate-fixing system introduced by Mr. Taylor is that the work of any establishment consists of various combinations of elementary operations. He concluded in 1883, while foreman of the machine shop of the Midvale Steel Co., that it was simpler to time each of the elements of the various kinds of work done in the place, and then find the quickest time in which each job could be done, by summing up the total times of its component parts, than it was to search through the records of former jobs, and guess at the proper price. After working on the matter for a year, he established the rate-fixing department, which has given out piece-work prices in the establishment ever since. "Before the best results were finally attained in the case of work done by metal cutting tools, such as lathes, planers, boring mills, etc., a long and expensive series of experiments was made, to determine, formulate, and finally practically apply to each machine the law governing the proper cutting speed of tools; namely, the effect on the cutting speed of altering any one of the following variables; the shape of the tool (*i. e.*, lip angle, clearance angle, and the line of the cutting edge), the duration of the cut, the quality or hardness of the metal being cut, the depth of the cut, and the thickness of the feed or shaving."

The "differential rate system of piece work," under which the output of men and machinery at the Midvale works was doubled and in many cases trebled, soon brought the men to realize that rates were fixed without regard to the records of the quickest time in which they had actually done each job, and thus the motive for "soldiering" ceased. Explaining the differential system, the writer says:

"This consists briefly in paying a higher price per piece, or per unit, or per job, if the work is done in the shortest possible time, and without imperfections, than is paid if the work takes a longer time or is imperfectly done.

"To illustrate: Suppose 20 units or pieces to be the largest amount of work of a certain kind that can be done in a day. Under the differential rate system, if a workman finishes 20 pieces per day, and all of these pieces are perfect, he receives, say, 15 cents per piece, making his pay for the day $15\times20=\$3$. If, however, he works too slowly and turns out, say, only 19 pieces, then, instead of receiving 15 cents per piece he gets only 12 cents per piece, making his pay for the day $12+19=\$2.28$, instead of $3 per day.

"If he succeeds in finishing 20 pieces, some of which are imperfect, then he should receive a still lower rate of pay, say, 10 cents or five cents per piece, according to circumstances, making his pay for the day $2, or only $1, instead of $3.

"It will be observed that this style of piece work is directly the opposite of the ordinary plan. To make the difference between the two methods more clear: Supposing, under the ordinary system of piece-work, that the workman has been turning out 16 pieces per day, and has received 15 cents per piece, then his days wages would be $15+16=\$2.40$. Through extra exertion he succeeds in increasing his output to 20 pieces per day, and thereby increases his pay to $15+20=\$3$. The employer, under the old system, however, concludes that $3 it too much for the man to earn per day, since other men are only getting from $2.25 to $2.50, and therefore cuts the price from 15 cents per piece to 12 cents, and the man finds himself working at a more rapid pace, and yet earning only

the same old wages, 12+20=$2.40 per day. What wonder that men do not care to repeat this performance many times?"

Regretting that we have not room for the exceedingly interesting details which Mr. Taylor gives, we quote in conclusion this more specific statement of what his system has done:

The first case in which a differential rate was applied furnishes a good illustration of what can be accomplished by it. A standard steel forging, many thousands of which are used each year, had for several years been turned at the rate of from four to five per day under the ordinary system of piece-work, 50 cents per piece being the price paid for the work. After analyzing the job and determining the shortest time required to do each of the elementary operations of which it was composed, and then summing up the total, the writer became convinced that it was possible to turn 10 pieces a day. To finish the forgings at this rate, however, the machinists were obliged to work at their maximum pace from morning to night, and the lathes were run as fast as the tools would allow, and under a heavy feed.

"It will be appreciated that this was a big day's work, both for men and machines, when it is understood that it involved removing, with a single 16-inch lathe, having two saddles, an average of more than 800 pounds of steel chips in 10 hours. In place of the 50-cent rate that they had been paid before, they were given 35 cents per piece when they turned them at the speed of 10 per day, and when they produced less than 10, they received only 25 cents per piece.

"It took considerable trouble to induce the men to turn at this high speed, since they did not at first fully appreciate that it was the intention of the firm to allow them to earn permanently at he rate of $3.50 per day. But from the day they first turned 10 pieces to the present time, a period of more than 10 years, the men who understood their work have scarcely failed a single day to turn at this rate. Throughout that time, until the beginning of the recent fall in the scale of wages throughout the country, the rate was not cut.

"During this whole period the competitors of the company never succeeded in averaging over half of this production per lathe, although they knew and even saw what was being done at Midvale. They, however, did not allow their men to earn over from $2 to $2.50 per day, and so never even approached the maximum output. The following table will show the economy of paying high wages under the differential rate in doing the above job:

Ordinary system of piece-work.		*Differential rate system.*	
Man's wages	$2.50	Man's wages	$3.50
Machine cost	3.37	Machine cost	3.37
Total cost per day	$5.87	Total cost per day	$6.87
5 pieces produced.		10 pieces produced.	
Cost per piece	$1.17	Cost per piece	$0.66

"The above result was mostly, though not entirely, due to the differential rate. The superior system of managing all of the small details of the shop counted for considerable."

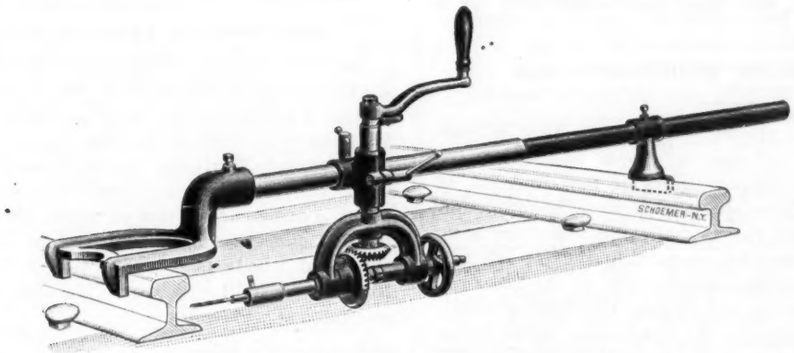
AT Ironwood, Mich., the board of review placed the following valuations on mines in that vicinity: Norrie, $1,298,000; Aurora, $792,000; Pabst, $712,000; East Norrie, $583,000; Newport, $528,000; Ashland, $484,000.

AT Alliance, O., the molders in the American Steel Casting Co. foundry, struck against deductions for imperfect work. Core-makers also went out.

AN IMPROVED DRILL FOR TRACK WORK.

The cut herewith shows the latest production of the Millers Falls Co., No. 23 Reade St., New York, in the way of track drills. The machine shown is styled "Track drill No. 5" Large numbers of the company's angular drilling machines have been used for track work—for drilling holes through rails for electric bonding wires, and for binding rods, etc. Experience made it plain that a horizontal shaft, as shown in the accompanying cut, is more suitable for the work referred to than the upright standards furnished heretofore, and they are now prepared to fill orders for this new pattern No. 5 drill.

Engineers and others familiar with the work for which the drill is intended, will readily appreciate its utility and convenience. It is made in the superior manner characteristic of all the products of this company. Two sets of gears go with each drill, making it either speeded or geared back. It weighs 68 pounds, and will carry drills up to one inch. Further particulars will be gladly furnished by the manufacturers upon application.



AN IMPROVED DRILL FOR TRACK WORK.

Lake Superior Iron Mines.

The Lake Superior Iron Co. have been doing some exploring with the diamond drill on their side of the old Lake Angeline basin. At a point near the pumping scow they cut about 90 feet of ore of Bessemer grade. Going 80 feet farther north they cut 29 feet of ore of similar quality, and another 80 feet further north they have found 29 feet of ore. In the latter assays have been made showing the ore to contain as high as 68 per cent iron. The result of the borings thus far made is certainly of a highly satisfactory nature, and suggests that a fine mine will be located at this point.—[Iron Ore, Ishpeming, Mich.

Shipments from Ashland for last week were 119,663 tons of ore; for the season to June 22, 728,956 tons. A careful computation, based on the expected shipments of Gogebic properties, mine by mine, makes the total that will go from Ashland this season very close to 2,200,000 tons.

The Blue Mining Co. has made a sale of 20,000 tons of ore at a price that exactly meets its cost in Cleveland. As the amount will be sufficient to relieve some of the pressing demands of the company, further sales at the same price are declined, though there will still remain in stock some 25,000 tons.—[Negaunee Iron Herald.

The Iron Cliffs has just shipped about 600 tons of a low grade ore from the old Foster pit at the Iron Cliffs location to a furnace at Detroit. The ore was mined some 20 years ago, and the stockpile is covered with moss and weeds. In case the ore can be utilized to good advantage the company may be able to sell the entire stockpile.

The Palms and Davis mines on the Gogebic have been unwatered and ore is now being hoisted at the former. The Davis will soon be in operation. Its ore is of good quality and carries a good percentage of manganese.

Ore shipments to June 1, from all upper lake ports were 1,447,329 gross tons, as compared with 1,208,469 tons to the same date last year. The increase is 238,860 gross tons, with the movement confined entirely to May this year, while April shipments last year were about 150,000 tons. Escanaba shipments up to June 20 were about 200,000 tons more than to the same date last year.

IMPROVED GRIP SOCKET.

The grip socket shown in the accompanying cuts is designed to hold and drive taper shank drills and other tools. A groove, which is an arc of a true circle, is milled in the shank of the drill or tool as appears in Fig. 1; a key let into the

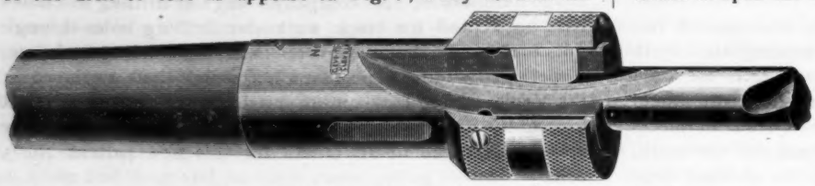


FIG. 1.—SECTION CUT AWAY TO SHOW GRIP OF KEY ON THE SHANK.

body of the socket fits into the groove, and is locked securely in place by a turn of the revolving collar, which is internally, eccentrically counterbored.

After the key is locked, it is impossible for the tool to slip in the socket or to be pulled out, until the collar is turned back again to release the key. The end of the collar is beveled, and a plain index mark on it and on the body of the socket shows when the key is released.

Drills or tools that have had the tangs on the shanks twisted off can be used in these grip sockets successfully, and in this way the cost of the sockets can be saved many times annually. Boring bars for under cutting can be used without any danger of their pulling out of the sockets, and the labor and expense of turning over heavy pieces saved.

These sockets are manufactured by the Cleveland Twist Drill Co., Cleveland, O., who have made application for a patent on the device.

BOILER MAKERS' BENDING ROLLS.

An automatic opening, closing and self-adjusting roll, designed for bending ⅜″, ½″ and ⅝″ plates is shown in the accompanying cut. The manufacturers are Bertsch & Co., of Cambridge City, Ind., whose specialty is metal handling and forming machinery. The cut specially illustrates the automatic arrangement for opening, supporting the top roll and also lowering and raising the opposite ends of the lower roll st the same time by opening and closing the bearing buckle B. The opening of the rolls, as the illustration shows, is accomplished in five to ten seconds, depending on the size of the machine, by simply disengaging the journal-bearing buckle, which when thus removed and turned back, will elevate and support the top roll and at the same time lower the opposite end of the bottom feed roll sufficiently to release a formed plate of extreme width which it is disired to remove. This is automatically accomplished by the attached horizontal forged steel lever beneath, which is operated by a lug or cam on the bearing buckle. This lever is also properly connected to the opposite ends of the top and bottom feed rolls, as shown in the cut. The lever is from six to 10 inches wide, varying according to the size of the machines, and from two to three inches thick in the center, to prevent springing.

The lower roll's adjustable bearing box, at the opposite end, is supported by a perpendicular fulcrum post (P, page 2), which rests firmly on top of the horizontal lever in the rear of the fulcrum pin (F.) Therefore the lower roll is free to be raised or lowered at the opposite end, automatically in conjunction with the top roll, so the top roll need not be elevated much to open the roll to free the formed metal the entire length, and the weight of the lower roll becomes an element in raising and supporting the top roll when opened to remove the formed metal. The bearing buckle being thus balanced, the roll is easily opened and closed, and by a slight turn of the lock screw in the center of the buckle, the machine is again ready for operation.

As the lower roll is thus self-adjusting, it need not be readjusted each time after bending a plate, unless the plate to be formed is much thicker or thinner, in which case the lower roll is adjusted at both ends by wedges, as usual, to grip the sheet to prevent slipping. The back roll being the main bending roll, either one or both ends can be quickly adjusted at one time, the adjusting screws being provided with a link belt chain attachment. The back roll is also arranged to be adjusted by belt power.

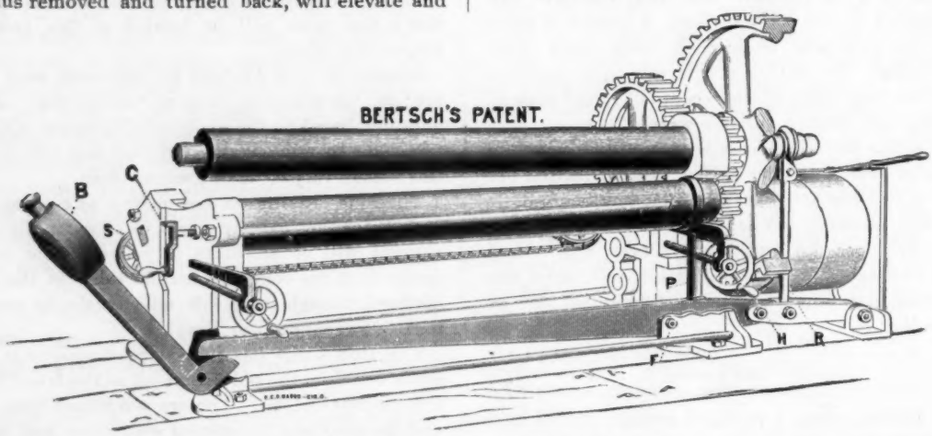
FIG. 2.—SOCKET AS TURNED OUT BY THE FACTORY READY FOR USE.

New Track for 1895 Put at 2,500 Miles.

The *Railway Age*, Chicago, contains statistics showing that the total miles of railway track laid in the United States from January 1 to July 1, 1895, were 641 miles on 65 lines, against 525 miles on 51 lines for the same period of 1894. In 23 of the 49 States and Territories no track has thus far been laid this year. In 17 of these 23 construction work is in progress or about to commence on one or more lines, but in six of the States, Connecticut, Delaware, Nevada, Nebraska, New Hampshire, and Rhode Island, not a mile of new line now appears likely to be built this year. The total new track for 1895 is estimated at 2,500 miles.

THE statement was made recently by an experienced iron maker, that present consumption in this country is 100,000 tons per month in excess of production. The declaration seemed wild. It now appears, however, that in May, the current output of furnaces in the United States was taken, and a little more than 100,000 tons drawn from the limited stocks. Probably the same rate of reduction is going on this month. A very little more of this, and the market will get away from the conservative influences that now control it.—[Rogers, Brown & Co.'s Market Review.

THE Delaware rolling mill, Philadelphia, will give its 300 employes a 10 per cent advance July 1.



BOILER MAKERS' BENDING ROLLS.

MR. KEEP'S LATEST INVESTIGATIONS.

Three papers by W. J. Keep, presented to the American Society of Mechanical Engineers at its meeting in Detroit this week, represent some of the results of Mr. Keep's latest investigations in his favorite field of experiment. One of these is under the title, "Report of the Committee on Standard Tests and Methods of Testing Material." The other two are also put in as part of the committee's work, but are not so described in their titles, the one being under the head, "Transverse Strength of Cast Iron" and the other entitled, "Keep's Cooling Curves—A Study of Molecular Changes in Metals Due to Varying Temperature." All are of interest to progressive foundrymen, and in lieu of reproducing the papers, we indicate in brief the line of investigation followed and the conclusions drawn, taking the papers in the order in which we have referred to them:

PAPER NO. 1.

This paper contains a detailed description of tests made as a part of the testing committee's work. In his paper before the Foundrymen's Association at Philadelphia, in June last year, Mr. Keep presented "an approximate key for regulating foundry mixtures." He laid down the proposition that "to produce a uniform grain and a sound casting, and one-eighth inch shrinkage to the foot, the silicon must vary with each variation in the size of the casting." The added statement was made that "such a variation in silicon will cause a variation in the shrinkage of a half-inch test bar." To prove the above proposition, the plan of making several series of test bars with varying silicon, and varying in size from one-half inch to four inches square was proposed. It was decided to include the investigation of shrinkage. The programme was as follows: The investigation should show the relation between different sizes of castings poured from iron of a uniform composition, the chemical composition of each size of casting when cold and the physical properties of each. The tests were not to be laboratory experiments but ordinary foundry work which should represent foundry experience. Test bar sizes were selected, representing all the sizes and shapes in use in any country for testing cast iron. These ranged from 1-10″x1″x12″ and ½″ square x 12″, Keep's sizes, up to 4″ square x 26″. Engineers', architects, water works and heavy castings bars were included and the size most used in England, 1″x2″x38″. Bars both round and square were made, some cast on end and some cast flat. The chemical composition was to represent all foundry mixtures varying from white iron to the softest gray. The former would contain less than one per cent silicon and the latter as high as 3.5 per cent. Enough pig iron was procured of uniform chemical composition to make six series of these castings, in which the silicon should be 1.00, 1.50, 2.00, 2.50, 3.00, and 3.50 per cent. The other chemical elements were to be kept substantially uniform in each. These variations in silicon would represent the silicon in all foundry work from heavy machinery to the lightest hardware castings.

The physical properties of the castings which were to be determined were the grain, the shrinkage, the chill, the strength. Pig iron was obtained from the Iroquois and the Hinkle furnaces, close to one per cent in silicon, and to secure the variations in silicon required, a high-silicon iron "Pencost" was employed, shown on analysis to run 11 per cent silicon. All these irons were carefully analyzed. The coke employed in the melting was also analyzed.

The details of each melt and the pouring of the iron for each series of test bars are given very fully by Mr. Keep. In addition to the six series each of the Iroquois and Hinkle iron, three series were made from iron from the De Bardeleben furnace. A 16th series was composed of bars from the foundry of C. G. Bretting & Co., Ashland, Wis., who use only No. 1 Hinkle, with scrap. A 17th series was made from white iron used in the Michigan Malleable Iron Co.'s foundry at Detroit, to show the influence of slow and fast cooling. An 18th series was furnished by Bement, Miles & Co., Philadelphia, from their heavy machine foundry, the metal being mixed in a large ladle. A 19th series was from a car wheel mixture poured in the foundry of A. Whitney & Sons, Philadelphia. All the bars made as above were shipped to engineering schools at which tests were made.

PAPER NO. 2.

In his second paper, Mr. Keep tabulates the results of the physical analyses of the 19 series of bars, the making of which is detailed in the first paper. He also plots in graphic form the same results, endeavoring to construct a curve by connecting the points on his graduated scale which represent the relative transverse strength of the various thicknesses of castings. A good deal of irregularity appears in the results. On this the writer comments: "The cause of much of the irregularity of these records is the varying conditions which surrounded all foundry operations. Practical iron founding cannot be separated from such influences, which produce variations in each casting."

In the pages devoted to the question "What these tests show," Mr. Keep presents much valuable matter which it would be interesting to reproduce entire, but space will permit only of extracting some of the more important deductions, without giving the explanatory and elaborated statements:

"As the base of all reasoning, let it, for the present, be accepted that strength is wholly dependent upon the grain. A casting may be brittle, and for that reason weak, as often occurs in small castings. If the grain is coarse and loosely formed, as in large castings, weakness will result from lack of cohesion. If the grain is fine and close, as in small gray castings, they will be strong.

"Strength increases in the one-half inch square bars with each increase of silicon. These tests show this to be true, with increases of silicon as high as 3.50 per cent, and this is as high as it will be found in any ordinary foundry mixture. The castings are also softer with each increase of silicon. This also corresponds with foundry experience.

"Strength decreases as castings increase in size, when both large and small castings are made from the same iron. Decrease in strength is more rapid in castings between the sizes of one-half inch square and one inch square than between larger sizes. The decrease grows less rapid for some differences in Si as the size increases. Decrease in strength is greater and more rapid with each increase of silicon.

"That increase of silicon weakens large castings is in accord with shop experience and with general opinion. The fact that a small casting grows stronger with each increase of silicon (at least up to three per cent) does not seem to have been noticed, probably because test bars of one square inch area have been used. It is the experience of makers of castings thicker than one inch, that any increase of silicon softens the castings, but at the expense of strength. For large castings, therefore, it has been the practice to use the least silicon that would produce the requisite softness.

"The record of one size of test bar cannot indicate the strength of another size, for the reason that, with the same iron, aside from the local causes of derangement, any change in size, or, in other words, any change in the rate of cooling, will change the grain and strength. Each mixture of iron and each percentage of silicon will produce the best results in some one single size of casting, and not as good a result in any other size.

"The term 'cast iron' does not indicate a definite composition. * * The test records of most investigators are of little value because they were not aware that a large casting cut down to another size was weaker than if cast to size and they were not aware that a variation in silicon would strengthen a small casting and weaken a large one. * * * The character of the original irons or the heat of the cupola at the time the iron was melted would change the strength, outside of the influence of silicon or the rate of cooling.

" * * * Prof. Furman estimates from his tests with a one inch square bar that 1½ per cent Si. will make the strongest castings. But the maker of machinery castings knows that the one per cent silicon iron will make a stronger heavy casting, and this is shown in the chart. The one inch square bar does not give intelligible results to him. While the one inch square test bar gives results nearer together than any other size, yet for light or heavy machinery irons it does not give intelligible results.

"The small variation in the records of one inch square and 1″x2″ bars shows that for castings about one inch thick, variations of one per cent of silicon in the mixture do not make much difference in the strength of the casting, and this accounts for the success of the average founder.

"What we have shown will explain why these sizes of test bars have been used almost universally, and why so little satisfaction has been found in the records of such test bars. The idea was, a test bar as near as possible to the average thickness of castings made in ordinary foundries, and a test bar that would give the most uniform results. This was because the nature of cast iron has not been understood. The strongest iron is that which contains the amount of silicon necessary to remove brittleness in the individual size of casting, and to produce the closest possible grain.

"The examination of the tests shown in the charts show that the ⅛″ square test bar indicates the natural strength of the iron, not influenced by slow cooling, and that a test of a 4″ square bar from the same mixture of iron, poured at the same time as the ½″ square bar, would show the character of the grain under the influence of slow cooling. Low silicon would give a weak ½″ square bar, and a strong 4″ square bar, and higher silicon would strengthen the ½″ square bar and weaken the 4″ square bar. If any of the methods for closing the grain had been used, it would be certain that the strength of large castings would be increased, but to how great an ex ent could only be learned by an actual test of a 4″ square test bar. This latter is very inconvenient in the foundry, and requires a large and expensive testing machine. The test of ½″ square bars is necessary to show the silicon and shrinkage in the castings of different sizes, and to give the natural strength of the iron."

Under the head "Methods for Producing the Strongest Castings," Mr. Keep makes these suggestions: "1. Using a low silicon iron for large castings. In all the charts, the low silicon irons give the weakest ½″ square and the strongest large castings (except series 17 which was not melted in a cupola.) 2. Using higher silicon irons which naturally have a close grain. 3. Powdered ferro-manganese is often thrown into a ladle to cause a fine granular structure. 4. Wrought iron borings or chips put in the cupola along with the pig iron will cause the grain to be close, and in this way adds strength. A rod of wrought iron is sometimes held in the spout of the cupola, so that the end may melt off and mix with the metal. An old file is sometimes melted in a ladle for the same purpose. 5. Cast iron chips or turnings are sometimes placed in wooden boxes with the covers nailed on and charged along with the pig iron, to cause an even and close granular structure in the casting.

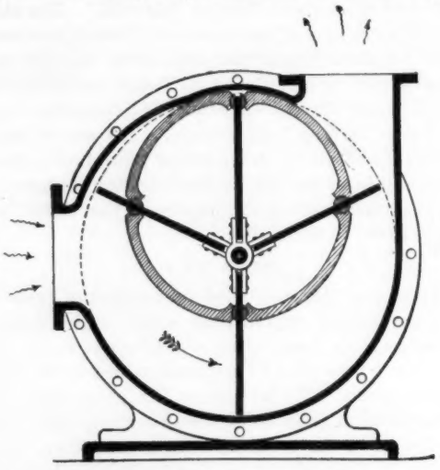
"The most profitable line for experiment is to find cheap, practical methods for closing the grain. The grains should be of uniform sizes and of the smallest possible dimensions. Such metal will not produce spongy cavities or shrink-holes at enlarged parts of a casting, and there will be very little uneven tension in different parts of such a casting."

Paper No. 3 will be synopsized in the next issue.

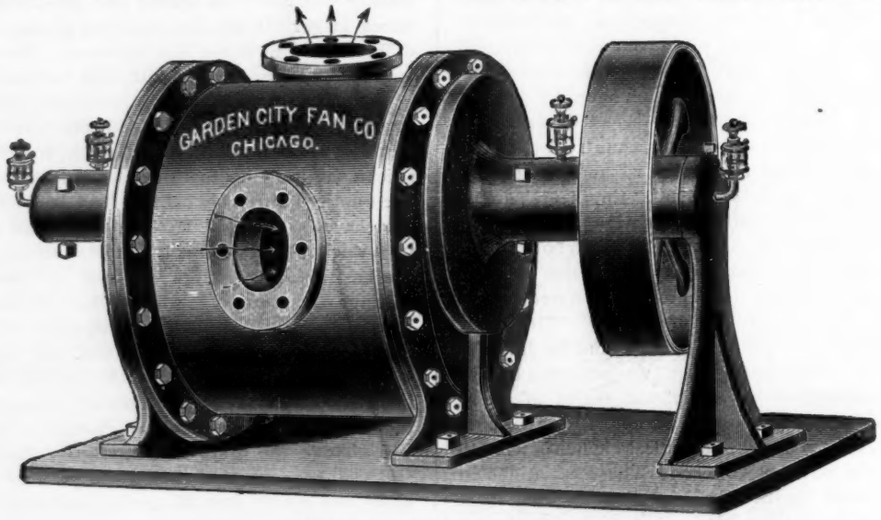
We quote from the circular of a leading manufacturer of boiler plates: "We do not anneal plates; when plates have to be annealed it is done to cover defects in quality." There is a possibility the same is true of boiler tubes.—[Boiler Maker.

NEW POSITIVE PRESSURE BLOWER.

The operation of the new pressure blower of the Garden City Fan Co., of Chicago, is well indicated in the sectional cut given herewith. The perspective view shows the blower complete. The eccentric drum, as the sectional view shows, is mounted upon a central shaft and carries four blades, in suitable slots, that are always in positions radial to the outer shell,



their outer edges touching the shell and their inner edges touching the central shaft. As the drum revolves these blades passing out of it slide in and out, and the angles at which they stand to the periphery of the drum are constantly changing. The slots are kept closed and the air is kept from playing in and out of the drum by means of the semi-circular pieces shown in the slots upon both sides of the blades. The makers say that these blowers have been worked up to a pressure of 45 pounds per square inch. Compressors of this type find an extensive field in the middle ground between the fan blower and the air compressor. They are made in ten sizes.



POSITIVE PRESSURE BLOWER.

At the annual meeting of the stockholders of the Bethlehem Iron Co., June 25, the following directors were elected: Robert H. Sayre, Sr., E. P. Wilbur, Robert P. Linderman, George H. Myers, Joseph Wharton, Beauveau Borie and J. Bertram Lippincott. The board elected Robert P. Linderman, president; R. H. Sayre, Sr., and R. W. Davenport, vice-presidents; C. O. Brunner, treasurer; A. S. Schropp, secretary; Owen F. Leibert, superintendent, and R. H. Sayre, Jr., assistant superintendent.

The Johnson Co. has posted notice of a 15 per cent advance in wages in converting mill, dry house and machine shop. The wages of shape mill employes were recently advanced.

Supt. C. C. Jones and F. F. Osborne, head bookkeeper of the Sharpsville and Douglass furnaces, Sharpsville, Pa., have resigned their positions.

WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, June 19, 1895, at the Great Northern Hotel, Chicago, the president, Mr. John M. Sweeney, in the chair.

The following were present: J. M. Sweeney, Chicago Consolidated Iron & Steel Co., Harvey, Ill.; Geo. M. Sargent, the Sargent Co.; A. M. Thompson, Link-Belt Machinery Co.; James A. Brady, Kurtz & Buhrer; O. T. Stantial, W. L. Lukins, Illinois Malleable Iron Co.; James Frake, F. W. Harrower, G. W. Scott, A. Sorge, Jr.; Alex. Cairns, Chicago Hardware Mfg. Co.; H. L. Hotchkiss, Deering Harvester Co.; A. W. McArthur, Rockford Foundry Co.; F. M. Lyon, Aurora, Ill.; John T. Rowlands, J. I. Case T. M. Co.; G. D. Chamberlain, So. Chicago; D. De La Fontaine, Crane Co., Chicago: Wm. Wilson, Cleveland Facing Mill Co.; James Fyfe, Pickands, Brown & Co.; H. S. Vrooman, Garden City Sand Co.; Robt. F. Palmer, *Industrial World*; W. D. Mahaney, *American Machinist*; B. M. Gardner, *Iron Trade Review*; S. T. Johnston, Whiting Foundry Equipment Co.

The Executive Committee reported that they had completed the papers for incorporating the Association, and that they were in the hands of Mr. Frake, who would send them to Springfield; also that the committee on the revision of the by-laws was at work on them and would report at the next meeting.

The following applications for membership were presented by the Secretary, and, on motion duly seconded, were unanimously accepted:

Mr. A. Sorge, Jr., of Chicago, Ill., and Mr. D. De La Fontaine, of Chicago, Ill.

Mr. Sweeney: The chairman desires to state that it was not intended at this meeting to pursue the usual course of discussing a paper, but to make the meeting as general as possible in its discussions, and to encourage more sociability among the members. The Executive Committee has canvassed the question and believes the Association would be very much benefitted by encouraging members to take a part in the meeting who may be backward about it. At previous meetings there have been many persons present who could have given a great deal of light on subjects up for discussion, who have said nothing. If possible, the management this year hope to conduct the affairs of the Association so that all may feel at home.

BLOW HOLES IN CASTINGS.

The Secretary then read the following question which was presented for discussion:

What is the cause of small, round, clean holes in castings in the solid parts? Can you tell me how to prevent the holes?

Mr. Sargent: I suppose these holes are caused by air that had been confined in the iron and tried to escape, but the cooling of the iron had prevented it from escaping causing the holes.

Mr. Sorge: I do not agree with Mr. Sargent in that. That condition would indicate an accident, and I do not think this gentleman would ask this question if it had simply occurred in one piece. I should judge that there had been a series of these difficulties. I do not think it is due to what we call "cold shortness." That not only shows itself in the shape of the small hole, but has a small ball inside of the hole. I do not know that it is possible to answer a question put in this shape. I think the chances are that the shape of the casting and method of molding have a great deal to do with the confined gases that should be able to escape. It would be impossible to answer the question and state a remedy without seeing what was being done and where the difficulty occurred.

Mr. Sweeney: There was an apparatus shown in the Swedish building at the World's Fair for the elimination of blow holes in steel ingots. The ingot at the time of its casting was placed vertically on a platform that hung from the end of an arm, in the way that a governor ball might be suspended. That arm was mounted on a central shaft. As soon as the mold was filled the shaft and arm would rotate, and centrifugal force threw the ingot more into a horizontal position, just as you used to take a bucket of water and throw it around your head and the water would stay in the bucket. The claim was that the pressure was in that way accumulated in the molten steel without being a pressure on the surface, and that the blow holes were not only eliminated but the piping of the ingot was increased, say thirty per cent. I noticed in a newspaper article in the last year that the method had been put into practice in Philadelphia, or it may have been in the Cambria Iron Works. That was to eliminate the holes which occurred in the process of cooling, and as soon as the rotation had continued for a few moments, a stream of water was turned on to the ingots and they cooled down suddenly.

Mr. Stantial: I agree with Mr. Sorge that these small blow holes are principally due to gases in the castings which have not had a chance to free themselves in the cooling. I would suggest as a slight remedy the addition of a little manganese in the ladle.

Mr. Sorge: It seems to me that it is almost impossible for a doctor to prescribe medicine unless he can see his patient. What is the article in which these holes occur? and what is the character of the holes? It seems impossible to tell whether they are due to gases or to vapor, water or steam, or due to some faulty method of molding which does not allow the gases to escape from the mold. It seems to me in trying to prescribe a remedy we are going a great deal on the basis of the faith cure. If we do not see the patient and know his symptoms it is impossible to prescribe. I happen to know in this case that the mixtures are a good deal at fault.

Mr. Stantial: I take it for granted that the little bubbles are formed by graphitic gases.

Mr. McArthur: At the risk of prescribing in the dark, I would say that I have found it beneficial to stir the iron with a steel rod while it is in the ladle.

QUESTIONS AS TO CRANES.

A letter from Mr. Thos. D. West on cranes was then read as follows:

"SHARPSVILLE, PA., May 14, 1895.

"To the Western Foundrymen's Association:

"GENTLEMEN: I think founders in general would like a frank expression from those who have used power cranes, as to their ideas of the advantages and disadvantages of the respective types now in use of 'jib' and 'traveling' cranes, in which steam, hydraulic, pneumatic or electric power is used and which are rapidly taking the place of hand cranes. Statements of experience from users of power cranes as to their sensitiveness in movements, economy in working and repairs, rapidity of working and general utility, practicability of the different systems in affording all the movements necessary to a crane, and ideas as to the best form for construction to obtain the greatest strength with the maximum of lightness combined with the minimum of cost, are greatly to be desired.

"We have six 'jib cranes' in our foundry, three of which are hand cranes and three are operated by steam power. The two largest cranes have each four cylinders so as to facilitate independent action of the racking and revolving gearing from that of the hoisting and lowering gearing. The small power crane has but two cylinders, as this one is pulled around by hand. Our daily heats run from 40 to 60 tons and hence it will be evident we have good use for speedy power cranes. The two largest cranes can be revolved, racked in or out and lowered or hoisted, all the movements required of a crane, by one man. They can lift their medium load of five tons 20 feet high in about 30 seconds, rack the same out or in, over a distance of 18 feet in about 40 seconds, and revolve the complete circle in about 50 seconds with 70 pounds pressure of steam at the boiler, which to reach the cranes is carried a distance of about 100 feet through a two and a half inch pipe. The steam works all right in summer, but in winter, we are very apt to experience trouble and expense, if the greatest of care is not used, by reason of pipes bursting. If the pipes had wrought iron flanges and fittings instead of cast iron this trouble would be largely prevented. Trouble is also liable to be had because of the cracking of valves, cylinder heads, etc., by the expansion of frozen water in them. These parts cannot be too carefully supplied with waste cocks to permit perfect drainage of condensed steam. The hoisting clutches on our cranes are of a design complicated, inconvenient to get at, and costing too much for repairs. The writer is pleased to say that improvements have been made lately in clutches which partly obviate these troubles.

"The racking arrangement could also be improved as with heavy loads of eight tons and upwards, we must assist the

racking by hoisting or lowering, a defect which I have observed in other cranes. The design of our cranes could also be improved by permitting the operator to have a clearer view of the load. If we had to build these cranes again we would use I-beams instead of the channel iron with which they are constructed so as to make them more rigid side ways. Do not think I am condemning these cranes, as there are many good features I could dwell upon. I am simply pointing out how they could be improved and I have yet to see the crane that did not have some objectionable feature. I have heard of some proving an utter failure, so that they had to be taken down and others of different design made to replace them.

Power cranes are, generally speaking, but a few years old to foundry practice; and there are few, if any, cranes that have been erected, in which the founder or user cannot find some objectionable feature and points which might be improved. For example, some will not hoist fast enough, are not sufficiently sensitive in their operation, the crane man is placed where he cannot properly see his load or he is placed where he almost would be roasted by heat or suffocated by gas. The crane might be all right for hoisting, but a failure in racking or revolving. Details are complicated and have not been studied with sufficient care to make the working parts durable and strong, or to withstand the dust and 'racket' to which foundry cranes are generally subjected.

"The main questions which present themselves to all intending to adopt power cranes for the first time are, as a general thing, first, shall they be 'jib' or 'traveling' cranes or both combined; second, shall they be of steam, hydraulic, pneumatic or electric power. A free expression on all the qualities of cranes from those who have been afforded an opportunity to use or build the various types or any one of them, to show their good and bad qualities and adaptability for special conditions and specialties in founding cannot be other than of much benefit to the trade.

"THOS. D. WEST."

The secretary also read the following additional note from Mr. West: "Since mailing my small paper to you yesterday, I have been thinking that a word in explanation of the class of clutches to which I had reference might be of some assistance in properly directing a discussion on that point. The clutch which I referred to is one which can take hold of the load at any point or revolution of a crane or its engines. There are clutches of the fork character which you have to watch for the point of insertion to properly come to its place. This causes a delay in the operation of the crane. At the time of the erection of our cranes, there was not to my knowledge any device in the field which could be utilized so as to have the load take hold at any point, other than the one we adopted, but this is very complicated and causes us too much for repairs, as stated in my paper. The same firm which manufactured this clutch has, owing to our complaint, devised a new system which, from its design, I judge is very simple and needs but very little repair. As clutches are a very important part of cranes working successfully and with good speed, you may be able to draw from this letter the qualities I had reference to in my paper."

DISCUSSION.

Mr. Sweeney: It seems to fall to my lot always to differ with Mr. West. I do not think the paper treats the crane subject in the right light at all. It is simply a story of a lot of old-fashioned cranes which are obsolete and would be of no use in a foundry to-day if a crane was wanted. The crane that a foundryman wants is a crane in which continuity of action can be assured. It is the most desirable feature of the mechanism. It does not make much difference how highly efficient the crane may be if it does not have continuity of action. I know of some cranes that were offered on the market a few years ago where the claim was made that they were very efficient and would save, I think it was, 98 per cent of the power furnished to the crane. This was a traveling crane. In that crane in a 50-foot span the trolley could not get to one end by four feet, and the other end by eight feet. In the 50-foot span the crane lost in the trolley travel 12 feet, and still these people said it was the most efficient crane on the market. They said they could not increase the travel of the trolley, unless the efficiency of the crane was destroyed.

Mr. Sorge: Mr. West does not give any points, or any actual statements as to what steam pressure he attains. I question very much whether he is getting over 50 pounds at the crane. As Mr. Sweeney has said, he is criticising a very old fashioned arrangement, one that is out of date. The main things we require in a crane are sensitiveness and rapidity. We have got to work quietly and gently. We must not have a crane operated by jerks and starts. It must operate smoothly and evenly, and rapidly or slowly as required. I think there is a large field for the jib crane yet. It is being used very largely nowadays. We have used the old fashioned winch and worked it by hand. We have also used the pneumatic and electric cranes.

Mr. Scott: Some years ago I was connected with Russell & Co., and we had a model foundry, at that time the best equipped for its purpose. We had an output of from 40 to 60 tons a day of high grade work. The room was oblong in shape with a middle bay and two side bays. The middle bay was controlled by a crane and the two side bays were given up to small work and managed entirely by jib cranes using air-pressure. The air pressure was about 80 pounds, and used in various cranes designed by our superintendent. The cranes had a capacity of from five to ten tons. I have observed those cranes on many occasions doing the nicest kind of work. I cannot recall any trouble with the cranes—in fact they were perfect.

The secretary then read the following letter, and exhibited the ore nuggets mentioned in it.

"MILWAUKEE, WIS., June 15, 1895.

"S. T. Johnston, Sec'y, Chicago, Ill.:

"DEAR SIR: Have ordered delivered to your office on Monday, June 17, samples of iron ore nuggets, one lot (black) made of Mesabi ore, the other (red) made of Lake Superior ore, Norrie mine. Herewith enclose information covering the process, machinery, etc., and kindly ask you to present the matter to your association. Several of the most prominent iron companies have investigated this new industry and they pronounce it a very valuable invention, presenting a practical and economical method for the utilization of fine, soft and flux ores. Yours,

"M. NIRDLINGER."

On motion the meeting adjourned.

Industrial Progress at Chicago Heights, Ill.

The Walburn & Swenson Co., whose specialties are sugar and mining machinery, and all kinds of heavy foundry work, has increased its force 100 men in the past week, and is operating its factory day and night. The company reports general prosperity throughout the country in its line of trade.

The Inland Steel Co., which manufactures plow beams, plow points and all kinds of agricultural steel, is constantly putting on more men and is at the present time enlarging its works for the purpose of increasing its output.

Wood, Smith & Co., manufacturers of wagon and carriage axles are operating their factory day and night and are putting on additional men from time to time. They have enlarged their works to quite an extent the past month, and the Michigan Central Railway Co. has put in more side tracks, for the purpose of enabling them to handle their raw material more conveniently. They have one of the most modern and best equipped axle factories in America, the main building being 80x100 feet, one story, with truss roof the entire length.

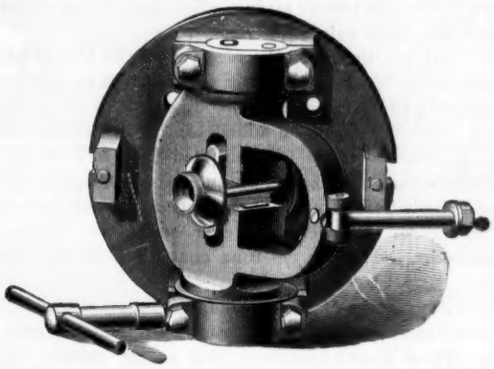
All of the other factories at Chicago Heights report doing a good business, and most of them are running day and night. The Calumet Chemical Co.'s new factory, which is now in course of construction at Chicago Heights, will be modern in every respect, and the company will have side track connection with the 38 railways that now enter Chicago.

IN the July *Lippincott's*, Chas. Morris gives an interesting account of "The Railroad Invasion of Asia." "Our National Extravagance" is exposed by Frances Courtenay Baylor, whose analysis of the American character, that "thinks it a fine thing to be pound-foolish and a mean thing to be penny-wise" will be recognized as true to life. The fiction of the number is plentiful and varied. The complete novel is "A Social Highwayman," by Elizabeth Phipps Train.

REVERSE END CHUCK.

The chuck shown herewith is designed for holding bicycle hubs or other similar work where it is desired to finish both ends or sides without resetting or removing the work from the jaws of the chuck. The chuck proper is a solid steel yoke, or head, having a journal at each side, on which it rotates in bearings on the main frame, or body, permitting the head and work to be completely reversed.

The head is fitted with a pair of steel jaws, having removable faces, which are bored to suit the work after the chuck is fitted to the lathe. The jaws are brought together simultaneously by a right and left screw, operated from either end, thus centering the work. On one side of the yoke is fitted a hinged bolt for securely clamping the head in either position. Hardened steel seats are also inserted in the yoke and main body to



insure the accurate alignment of the work. The main body is fitted to a face plate on the spindle of the lathe or screw machine in the usual way.

The chuck is manufactured by the Garvin Machine Co., New York.

Cost of By-Product Coke Ovens.

We are frequently asked as to the cost of by-product coke ovens. It should be remembered that a plant of these ovens includes not only the coke ovens with their gas apparatus but a condensing plant as well, in which the tar is condensed, and the ammonia, and if deemed wise, the benzole are scrubbed out. It is difficult to get exact figures on the cost of a plant, but it can be said in round numbers that the entire plant, coke and condensing apparatus costs in Europe from $1,800 to $2,800 per oven, according to the style of oven and what is included in cost according to the figures of the several oven proprietors. The Otto-Hoffman oven is the most expensive, costing according to a recent statement, $1,635 for the condensing plant and $1,170 for the oven side. The cost of the condensing plant is high, because the apparatus is in some parts duplicated to avoid loss from stoppages which the other oven proprietors claim are very rare. The cheapest oven, according to the statements of its owner, is the Huessner, the total plant costing only some $1680. This does not include a recuperator.—[American Manufacturer.

SOME time ago the men employed by the Illinois Steel Co. sent a committee, whose expenses were paid by the company, on a tour of investigation to all the large steel plants in the country, to compare the wages paid at each of them with those paid by the Illinois Steel Co. This committee returned last week and made its report to the effect that the men in the employ of the Illinois Steel Co. are at present receiving as high wages as any in the country. Notwithstanding this report, the Illinois Steel Co. last week announced that an advance of 10 per cent would be made at all their works, and go into effect July 1.

THE Illinois Steel Co. announces that Mr. Chas. C. Cluff has been appointed general eastern agent of the company, his appointment to take effect July 1. The company says: "Mr. Cluff will look after all sales for our company in the Eastern territory, and any correspondence or inquiries, with reference to price of rails, billets, blooms, slabs, plates, sheets, rods, structural material, etc., should be addressed to him at 46 Wall St., New York."

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

Jonathan Clark & Sons Co., 4 Sherman St., Chicago, want one American, Mundy or Lidgerwood double-drum hoisting engine.

A machine shop has been established by Bradley & Durner, at Kansas City, fitted with improved machinery, to do all classes of repair work.

The Challenge Machinery Co., 2529 Leo St., Chicago, is in the market for a universal grinding machine, about 18-inch swing and 40 inches between centers.

The Collins Mfg. Co., Jackson, Mich., are in the market for a 125 h. p. engine and boiler, second-hand, and a full line of second-hand wood-working machinery.

C. A. Sigelen & Co., Indianapolis, sales agents for fire brick and clay, write they are in the market for a second-hand pendulum foot press, knuckle joint preferred.

Central Engine Power Co., was incorporated at Chicago; capital stock, $500,000; to manufacture engines. Incorporators, Herbert E. Gilbert, Alvin H. Dodd and Joshua T. Gillelan

Globe Machine Co., has been incorporated at Chicago; capital stock, $75,000; to manufacture machinery. Incorporators, Ed. M. Gage, Thomas R. Martin and Milton A. Sherman.

Charles Rothlisberger, 1103 N. Hickory St., Joliett, Ill. wants to buy a second-hand gasoline engine, three or four horse power, with reversible motion; state weight and price.

Bullard Electric Co. has been incorporated at Chicago; capital stock, $25,000; to manufacture electrical apparatus; incorporators, Charles W. Bullard, Aubert S. Bullard and Carl E. Kammeyer.

The Universal Power Co., of Portland, Me., has been organized, with a capital stock of $20,000, to deal in all kinds of machinery. The officers are E. S. Hammenay, president, and J. M. Hubley, treasurer, both of Chelsea, Mass.

Fires and Accidents:—

The Wells Rustless Iron Co.'s plant, Hackensack, N. J., has been destroyed by fire and damaged nearly $10,000.

At Laporte, Ind., W. E. Harding's machine shop, with its contents, was burned June 17. Loss $3,000; insured for $1,400.

At Waterbury, Conn., the extensive plant of Randolph & Clowes, manufacturers of sheet brass and copper tubing, was partly destroyed by fire June 19.

The foundry of March, Brownback & Co., of Reading, Pa., was recently destroyed by fire. The loss is estimated at about $20,000. Many valuable patterns were consumed.

Metal broke out from the Thomas furnace at Niles last week, setting fire to the engine house. The engines were saved from serious damage. The loss is practically confined to that on the building, the furnace resuming within a day or two.

Additions, Enlargements, Removals, Etc.:—

A new building is being erected by the Lowell Foundry, Lowell, Mass., which will allow of the employment of 80 additional men, there being 300 at present.

The plant of the New Castle (Pa.) Electric Light Co., will be greatly enlarged. Engines of 600 h. p. will be added and there will also be erected an incandescent light plant.

The Fort Worth Iron Works, of Fort Worth, Tex., has increased its force of men, and extensive additions are to be made to the plant in expectation of a largely increased business.

The Toledo Metal Wheel Works, Toledo, O., will erect an additional building three stories high, 150x50 feet, to be used in the manufacture of bicycles. It will be equipped with high grade machinery.

The Eclipse Bicycle Co., of Beaver Falls, Pa., owing to the insufficient fire protection there, is considering a proposition to remove to New Castle, Pa. It has shipped $250,000 worth of bicycles thus far this season.

The Maryland Steel Co., of Sparrow's Point, Md., is now constructing a large extension to the foundry of the Watts Campbell Co., of Newark, N. J. It was designed by the Mary-

land Steel Co., and is to be of iron construction and supplied with traveling and jib cranes and especially fitted for making heavy castings for Corliss engine work.

The Builders' Iron Foundry, of Providence, R. I., is erecting an extension to its present large place which will measure 42x94 feet, and 24 feet in hight to the eaves. This building will be unusually well lighted and will be devoted to architectural iron work. It will be traversed by two traveling cranes, which will unite or overlap with a traveling crane outdoors. Electric motors will furnish all power needed.

New Construction:—

The Relay Mfg. Co., Reading, Pa., bicycle manufacturers, will erect a three-story factory, 200x45 feet, and fit it with the latest machinery.

Watson H. Bliss & Sons, Hartford, Conn., have secured the contract for erecting the machine shop of Cheney Bros., at Manchester, Conn.

Riter & Conley, of Pittsburg, have received a contract from the Pennsylvania Tube Works of that city for the erection of an iron building 90x150 feet in size.

It is reported that Wm. M. Whiteley will rebuild at Springfield, O., and that the factory of the Champion Reaper Works will be located there.

The Marvin Drill Co. have acquired the buildings of the Canastota Match Co., at Canastota, N. Y., and will put up a plant to manufacture on a large scale the Marvin electric rock drill and dynamos.

At Pittsburg the new sheet mill of Zug & Co. is about to be put in operation. It contains two trains of rolls and will have a capacity of about 80 tons of sheets a week. Work was commenced on the new building about two months ago by the Shiffler Bridge Co. Mackintosh & Hemphill furnished the rolls and machinery.

It is now decided that the Cleveland-Cliffs Co. will build its charcoal kilns and chemical plant at Gladstone, Mich., in connection with its furnace plant. It had been the intention to locate them in the timber district some distance from Gladstone. The foundations for the furnaces are completed and the machine shop is nearly completed.

General Industrial Notes:—

The Albany Iron Works, Troy, N. Y., started its 18-inch and Belgian trains last week.

Preparations for resumption are being made at the Hellertown Furnace of the Thomas Iron Co.

McNeal Pipe & Foundry Works, Burlington, N. J., made a 10 per cent advance in wages last week.

The Cumberland Nail & Iron Co., Bridgeton, N. J., expects to operate the Bridgeton pipe mills very shortly.

Sharon (Pa.) Iron Works Co.'s laborers struck for an advance from $1.15 to $1.25 a day. The mill is shut down.

An increase of 10 per cent in wages has been announced by the Conshohocken Tube Works, Conshocken, Pa.

Baker Chain & Wagon Mfg. Co.'s men at Wood's Run, Pa., struck for 20 per cent advance and took 10 per cent.

Work is to be resumed at the Norristown Steel Co.'s plant, which is controlled by the American Steel Casting Co.

The Pulaski (Va.) Iron Co., John W. Eckman, general manager, will build a new 150-ton iron furnace at that place.

The Lackawanna Iron & Steel Co., at Scranton, Pa., granted an increase of 10 per cent to its employes numbering 5,000.

All departments are affected by the 10 per cent advance in wages made by the Illinois Steel Co., at its Bay View plant.

After a suspension of some months work is to be resumed at the 65-inch mill of the Pottstown Iron Co., Pottstown, Pa.

The business of the Germantown Tool Works, Germantown, Pa., has revived and a 10 per cent advance of wages has been made.

An average increase of 10 per cent will be made in wages at Lloyd, Booth & Co.'s foundry at Youngstown, on the next pay day.

The Southern Foundry & Machine Co. has closed its works for a short time to take stock and make some additions to its plant.

One of the Oxmoor furnaces and one of the South Pittsburg furnaces of the Tennessee Coal, Iron & Railroad Co. will blow in.

Additional boiler capacity is being supplied the Ohio Steel Co.'s plant at Youngstown, O., by putting in 1,500 h. p. of the Pierpoint boiler.

Hibbard, Spencer, Bartlett & Co., the large wholesale hardware dealers of Chicago, have advanced the wages of their employes 10 per cent.

Furnace workers at the Clinton Iron & Steel Co.'s furnaces, Pittsburg, struck for additional help. Negro workmen have been put on in their places.

The Carbon Iron & Steel Co., Parryville, Pa., has spent $100,000 in improvements and the furnace has blown in after a suspension of over a year.

The Youngstown (O.) Bridge Co. has taken at $27,000 the contract for the steel construction for the grand stand at the State fair grounds at Springfield, Ill.

The Bellaire Nail Works advanced wages another 10 per cent last week, the new rate to go into effect Aug. 1. A 10 per cent advance was made only a few weeks ago.

The court has dismissed the receiver of the Maryland Steel Co., Frederick W. Wood, and has ordered him to turn over all the property in his hands to the company.

Tack machinery will be added to the Braddock, Pa., and Joliet, Ill., plants of the Consolidated Steel & Wire Co., and the manufacture of tacks begun on a large scale.

The Illinois Steel Co. has just shipped to Owen Sound, Ont., the first cargo of steel rails ever sent from Chicago to a foreign port. It was 2,370 tons consigned to the Canadian Pacific.

The Union works of the Illinois Steel Co., at Chicago, will be started in full about July 15, after a stoppage of over three years. These works have been and are at present undergoing extensive repairs.

The Anniston, Ala. plant and property of the Hercules Pipe & Foundry Co., which went into the hands of receivers a year ago, were sold recently, being bid in by J. J. Willett, trustee for the bondholders, at $30,000.

The Sunbury Nail Mill, Sunbury, Pa., idle since April, 1890, was sold June 21 to Philadelphia, Pottstown and Harrisburg capitalists for $12,000. The new company will repair the mill and start it as soon as possible.

A receiver has been appointed for the Perry Stove Co., Albany, N. Y., which made an application for voluntary liquidation, the stockholders deciding it was undesirable to continue the business on the present basis.

Witherow works at New Castle, Pa., have started up again. A bell for Atlantic furnaces, a new bell and hopper for the Edith, a large spur wheel and sheet mill rolls, pillar blocks, air pumps, and water and acid tanks are among recent orders.

The American Steel Casting Co., recently declared a dividend of 3½ per cent on preferred stock, payable June 29. The company is operating six plants, located at Thurlow, Norristown, Pittsburg and Sharon, Pa., Alliance, O., and Syracuse, N. Y.

Joseph F. Cofrode, one of the receivers for Cofrode & Saylor and the Reading (Pa.) Rolling Mill, has resigned. Some complaints have been made by creditors of the company, but it is now believed matters will be adjusted and the receivership terminated in July.

The Lindsay Bicycle Mfg. Co., of Lafayette, Ind., recently incorporated to manufacture a patent two-speed bicycle, has placed an order with the Lodge & Davis Machine Tools Co., Cincinnati, for the entire equipment of their plant, including several screw machines, sprocket milling machines, hub turning machines, etc.

The Niagara Falls Hydraulic Power & Mfg. Co., Niagara Falls, N. Y., has recently installed a rope drive which requires 2,550 feet of Hunt "stevedore" rope. This rope, especially adapted for transmission purposes, is made exclusively by the C. W. Hunt Co., New York City.

The No. 1 furnace of the Thomas Iron Co., at Hokendauqua, Pa., recently produced 1,106 gross tons of foundry iron in one week, using three-fourths coke and one-fourth anthracite coal as fuel. This is said to be a record-breaker in the Lehigh Valley. Durham iron pipe stoves are used.

Thos. Marshall, of Pittsburg, took the contract at $19,947 for steel skylight framing, roof over mailing platform, steel vault lining, etc., for the new United States post office building in Washington. The highest bid was that of C. A. Schneider's Sons, of Washington, at $39,750.

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Manufacturers of

The Pittsburgh Safety Water Columns,

Pittsburgh Rotating Gauge Cocks, Pittsburgh Boiler Oil Feeders,

STEAM APPLIANCES For Every Condition. Complete **BOILER EQUIPMENTS.**

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AN INVENTION OF INESTIMABLE VALUE TO THE MINERAL WORLD.

Now ready, machinery and process by which all small or flux ores can be prepared in any shape or size desired, ready for the cupola or furnace, at a very small cost.

Experts pronounce this invention most valuable, furnishing an inexpensive method for utilizing the soft and waste ores and thus reclaiming a large percentage of the most superior minerals.

For terms, machinery, territory, etc., address

Acme Mineral Nugget Co.,

M. NIRDLINGER, Pres. **360 Farwell Ave., MILWAUKEE, WIS.**

A. & P. Roberts & Co., recently demolished the only remaining building at Manayunk, Pa., of the original plant built over 40 years ago. In its place will be erected a larger and modern structure. The demolished building was the first one built in 1852, when the manufacture of anvils was begun by the firm.

At Superior, Wis., on motion of the Lehigh Coal & Iron Co., the superior court appointed Thomas G. Alvord receiver of the West Superior Iron & Steel Co. The action was due to a decision of the supreme court that the actions brought in 1893 in the superior court did not warrant the appointment of a receiver. Receiver Kelley appointed then, will be compelled to turn over the plant to the new receiver.

Among recent steel lake vessel contracts are those taken by Wheeler & Co., of Bay City, Mich., for a freight steamer 358 feet over all for David Whitney, Detroit, and one taken by the Globe Iron Works Co., Cleveland, for interests represented by M. A. Hanna & Co., calling for a new boat to take the place of the sunken steamer Norman. It will be 420 feet over all. The Wheeler Co., has ordered material also, for a boat to be built on its own account, similar to the Whitney boat.

Steam was first turned into the cylinders of the new tandem compound engine at the New Castle Wire Nail Co.'s rod mill last week. The cylinders are 36 and 70 inches and the stroke 60 inches. The main shaft is 24 inches in diameter and of hammered iron. The drive-wheel is 25 feet in diameter, with an eight-foot face, and is driven by 34 two-inch ropes. This wheel weighs 85 tons and was cast in six segments, each segment thus weighing over 14 tons. The total weight of the engine is about 325 tons.

The creditors of the Pennsylvania Steel Co., and the Maryland Steel Co., received June 22 from the reorganization committee their certificates of indebtedness, together with a check for interest. The committee also enclosed a check for 30 per cent of the face of each creditor's claim and state that the remaining 10 per cent will be sent as soon as practicable. The new bonds for the 60 per cent of the claim will bear interest from Sept. 1, 1895, the first coupon being payable March 1, 1895.

The Edward P. Allis Co., of Milwaukee, has received a contract from the Thomas Furnace Co., of Niles, O., for one vertical Reynolds blowing engine, to be equipped with Reynolds rolling inlet valves with a positive motion and the Reynolds patent poppet valves for the discharged air. The Allis company has also secured a contract from the Carnegie Steel Co. for seven duplex cross compound condensing blowing engines having 40x60 high pressure, 78x60 low pressure and 76x60 blowing cylinders to be installed in the blast furnace plant now under erection at Duquesne.

Connellsville, Pa., is to extend itself by means of a lot-buying and industry-locating enterprise. Geo. J. Humbert, representing outside capital, agrees to bring to the town, provided citizens buy $150,000 worth of lots in the Connellsville extension which his company is laying out, a four-mill tin-plate works, costing not less than $150,000. The plant is to be operated for a period of a year. The performance of this contract is to be secured by a bond of $150,000 to the satisfaction of Connellsville citizens. Other industries under negotiation by the same company are a boiler works, an enameling works, boot and shoe factory, furniture factory. Lots worth nearly $100,000 have been subscribed for thus far.

Geo. Westinghouse makes the following statement as to the reported contract with his company to equip the Manhattan Elevated Road with electric motors: "This statement is

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.,

Proprietors of the CELEBRATED Mount Savage Fire Brick.

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The Iron Trade Review Pays special attention to iron ore, blast furnace, rolling mill, foundry and machine shop interests. Per year **$3.00.**

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Our large capacity, 8,000,000 annually, and modern plant, enable us to handle contracts of any size promptly.

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premature. For the past two years conferences have been going on constantly with reference to this work, but action has been delayed on the advice of the Westinghouse company pending the perfection of the forms of motors to be operated under the Tesla inventions, it being now conceded that motors of this character, owing to their superiority, will supplant the earlier kind of motors. The Manhattan officials believe that the Westinghouse people have the exclusive right to manufacture apparatus under the Tesla patents and are now giving the matter their especial attention."

New and extensive fields for blowers and hot blast apparatus are constantly developing. A number of years ago, it became apparent to the Buffalo Forge Co. that around every large brick plant a great deal of heat was being wasted. It is now introducing large numbers of steel plate fans of special construction to be used for drying purposes, utilizing the heat from the burning kilns in so doing. Large fans for such service are in use at the yards of the May, Purington & Bonner Brick Co., Weber-Labahn Brick Co., Jefferson Brick Co., B. F. Weber, and other well known concerns of Chicago and other large cities. Upon this improved apparatus, the Buffalo Forge Co. has obtained patents, and also upon the special arrangement and application for drawing heat from one kiln to another for cooling purposes.

Iron works in and about Ironton, O., are quite well employed. The *Register* reports the following concerning some of them: The Eagle mill is quite active. It has been running double turn for five or six weeks, and while they expected to stop for the most of the month of July, it looks now as though they will not have a chance to stop, except a portion of the mill about ten days, to repair the sheet mill engine. The sheet rolls are crowded with orders. The mill has lately contracted to finish a large bill of thin sheet steel to be made into patent steel lath. Lambert's machine shops secured a $2,000 government contract last week for irons on Lock 2, Kentucky river, and repairs on a lock on Rough river. The shops are actively engaged on the Sarah Furnace engine, an engine for Joshua Oakes & Sons, and other work. Belfont mill is not running. Belfont furnace is doing finely, making 100 tons of metal a day. The Kelly nail mill is silent. Foster's foundry is in the midst of a steady run. Their business is 33 per cent greater than this time last year. After July 4, the foundry will change to winter stoves without stopping. They will establish a branch house at Louisville. The employes of Sarah furnace received an advance of 10 per cent at the last pay. The furnace continues its very successful run.

REDUCED RATES.

Excursions over Pennsylvania Lines During Season of 1895.

Liberal concessions in fare over the Pennsylvania Lines have been granted for numerous events to take place this summer in various parts of the United States. In addition to local excursions, tickets at reduced rates will be sold over these lines as given in the following paragraphs. Excursion tickets may be obtained at ticket offices on the Pennsylvania system and will also be sold over this route by connecting railways. Some of the points to which tickets will be sold and dates of sale are as follows:

To Chattanooga, Tenn., June 25, 26 and 27 inclusive, account Epworth League International Conference, good returning 15 days from date of sale. By special arrangement return limit may be extended an additional 15 days.

To Denver, Colorado Springs, Manitou or Pueblo, Col., July 3, 4 and 5, account National Educational Association Meeting. The return trip must be commenced July 12, 13, 14 or 15, unless by special arrangement the return limit is extended to Sept. 1.

To Baltimore, July 16 and 17, good returning until August 5 inclusive, account the Convention of Baptist Young People's Union of America.

To Boston, July 5 to 9 inclusive, for the National Christian Endeavor Mee ing. Return limit may be extended by special arrangement to August 3.

To Louisville, Ky., in September, for National Encampment, G. A. R. One cent per mile. Reasonable return limit.

To Boston, August 19 to 25 inclusive, account Triennial Conclave Knights Templar. Return limit extended to October 3 by special arrangement.

The reduced rates over the Pennsylvania Lines will not be restricted to members of the organizations mentioned, but may be taken advantage of by the public generally. Any Pennsylvania Line Ticket or Passenger Agent will furnish desired information concerning rates, time of trains, and other details, to all applicants, or the same may be obtained by addressing F. Van Dusen, Chief Assistant General Passenger Agent, Pittsburg, Pa.

THE D. & C. new steamers are now running four trips per week between Toledo, Detroit and Mackinac. Send for their illustrated pamphlets, Midsummer Voyages to Mackinac. Address A. A. Schantz, G. P. A., Detroit.

SUMMER OUTINGS.

At Seashore, Mountain and Lake Resorts.

The Ocean Resorts—Atlantic City, Cape May, Asbury Park, Ocean Grove, Long Branch, and famous resorts along the New Jersey Coast are reached by the Pennsylvania Lines. As a direct route to Newport, Narragansett Pier, Cape Cod, Martha's Vineyard, Nantucket and the popular watering places along the Atlantic from Chesapeake Bay to Maine, these lines offer special advantages.

In the mountains—Cresson, Bedford Springs, Ebensburg, Altoona and other resorts in the Alleghenies are located on the Pennsylvania Lines, which also lead to the White Mountains, the Adirondacks, Watkin's Glen, Mt. Desert Island, and places of summer sojourn in Eastern New York, Vermont, New Hampshire and Maine.

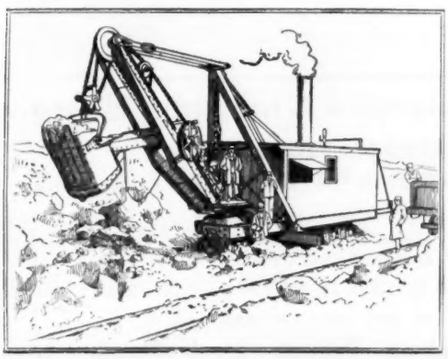
For information concerning rates, time of trains and the first-class service, please apply to nearest Pennsylvania Line Ticket Agent, or address F. Van Dusen, Chief Assistant General Passenger Agent, Pittsburg, Pa.

Low Rates to Colorado.

On account of the meeting of the National Educational Association at Denver, Col., July 5 to 12, 1895, the North-Western Line will sell excursion tickets to Denver, Pueblo, Colorado Springs and Manitou at a rate not to exceed one fare for the round trip (with $2 added for membership fee). The time limit of these tickets will be extremely liberal, and an excellent opportunity will be afforded for a summer sojourn in the "Rockies," or enjoyable side trips to the Black Hills, Yellowstone National Park or the Pacific Coast. For full information apply to agents of connecting lines, or address W. B. Kniskern, General Passenger and Ticket Agent, Chicago & North-Western Ry., Chicago.; C. Traver, T. P. A., Marine National Bank Building, Pittsburg; F. M. Snavely, T. P. A., 151 St. Clair st., Cleveland, O.

Summer Tourist Rates.

The North-Western Line (Chicago & North-Western Ry.) is now selling excursion tickets at reduced rates to St. Paul,



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GOLD SAVING MACHINERY	For Placer Mining. With steam shovels and appliances for disposal of tailings.
WRECKING CRANES	Hand or Steam, 5 to 35 tons capacity. Also Locomotive Cranes and Pile-Drivers.
CENTRIFUGAL DREDGING PUMPS	6-inch to 36-inch. With either simple, compound or triple engines.

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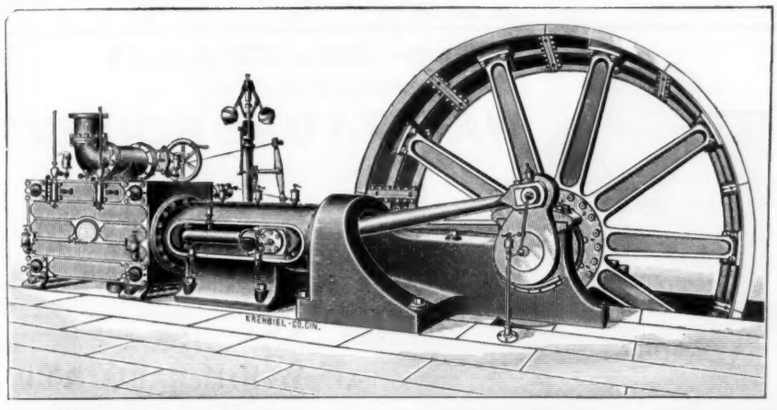

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Weight 55 tons, capacity 2,500 cubic yards per day.

Our "GIANT" C R. R. Excavator, weight 30 tons, capacity 1,500 cubic yards per day.

The Little "Giant"

Railroad

Excavator.

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See next issue.

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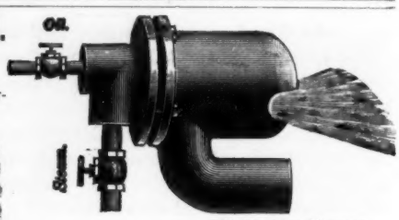

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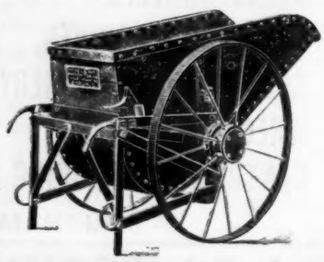

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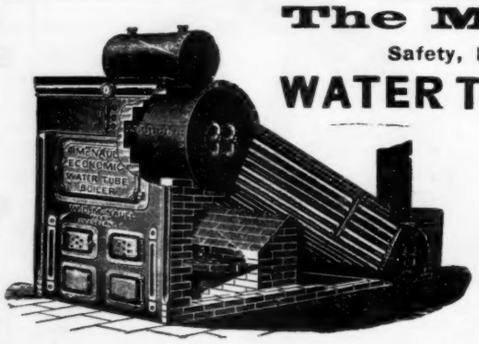

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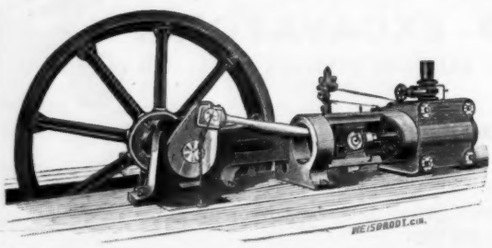

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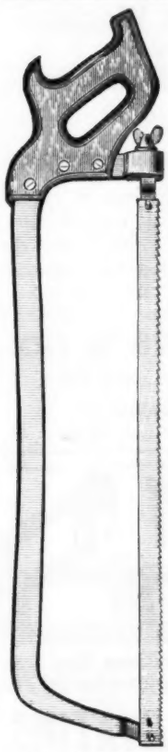

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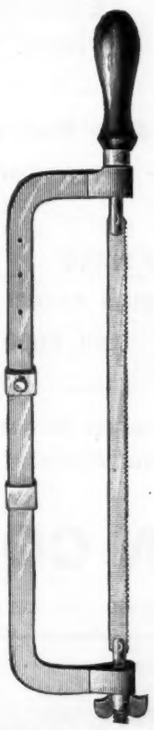

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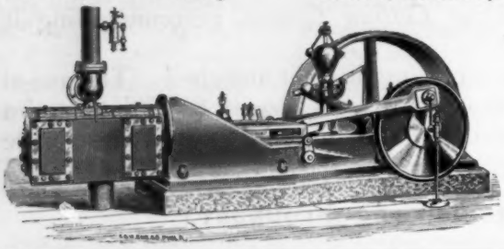

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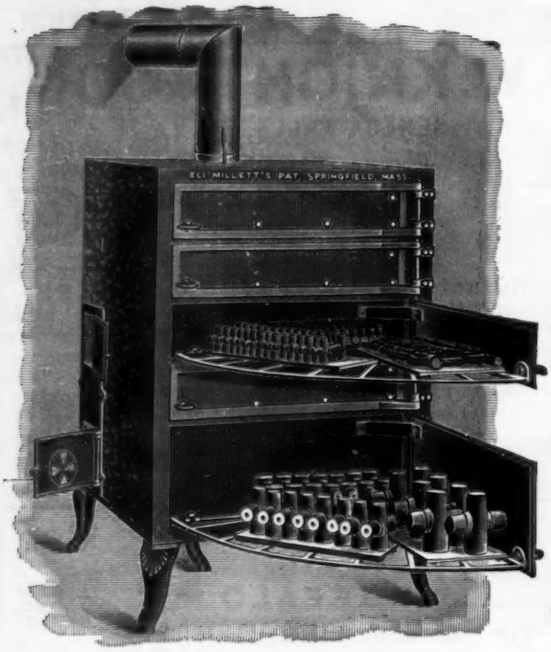

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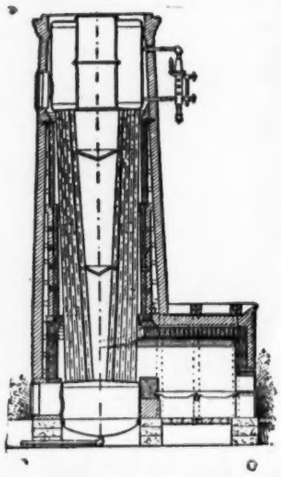

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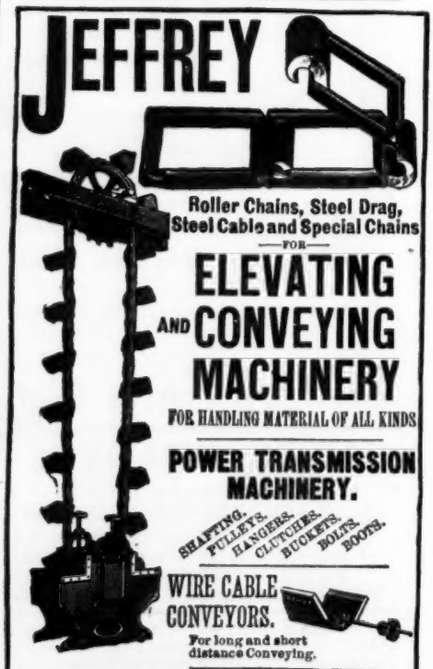

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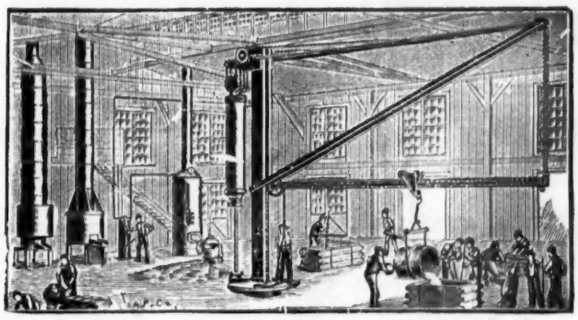

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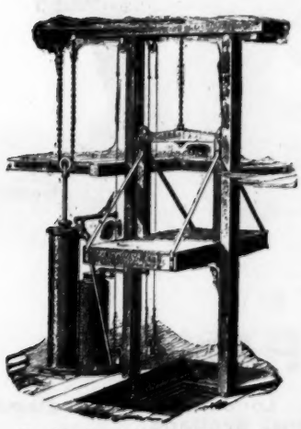

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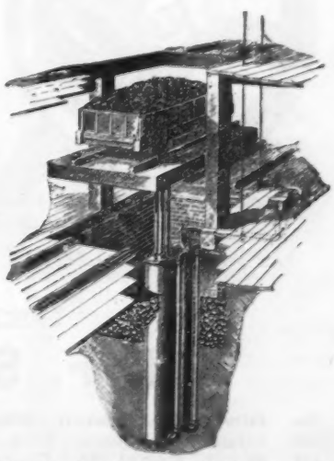

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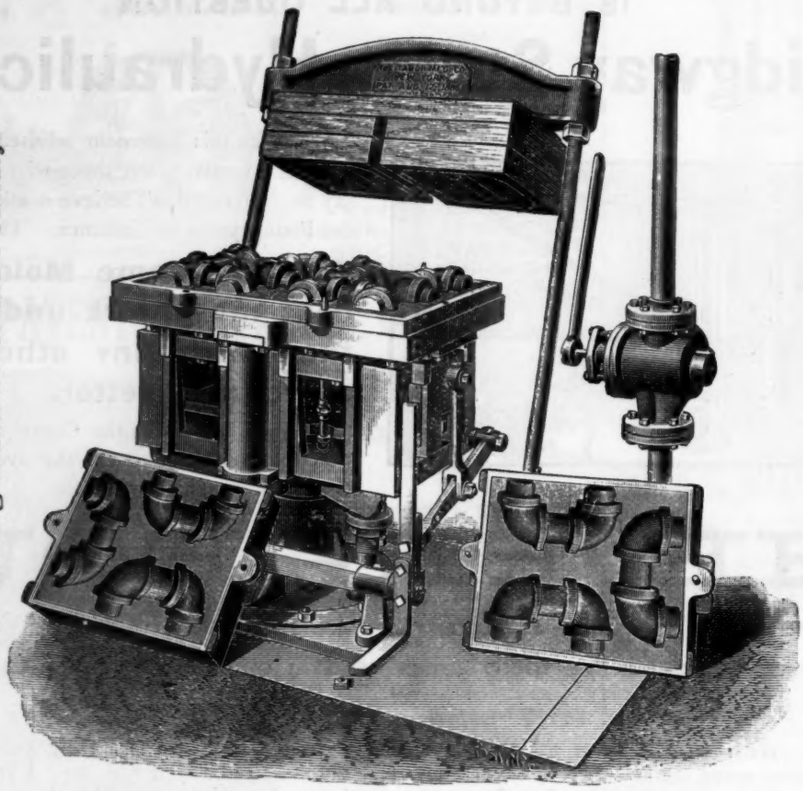

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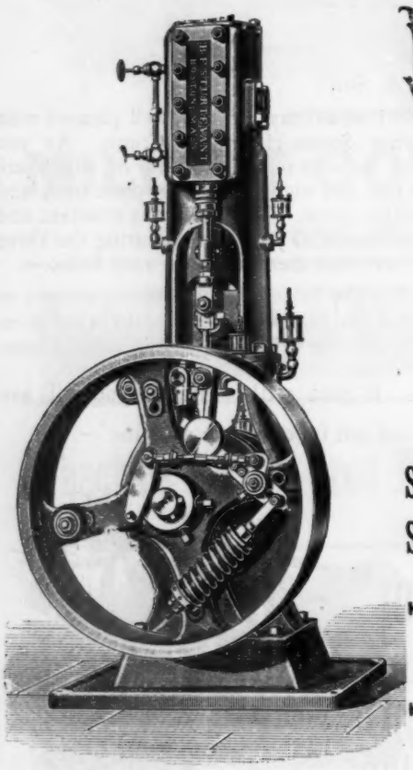

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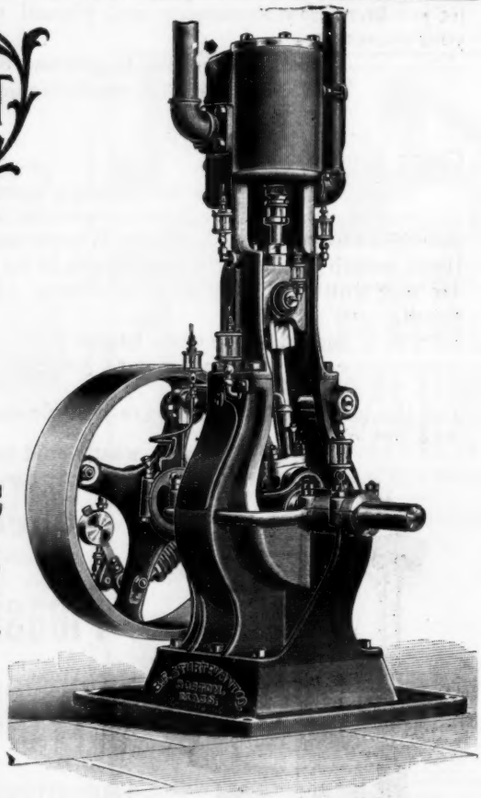

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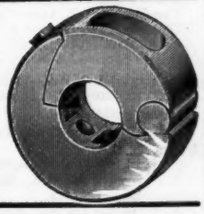

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Every Planer Offered is a Bargain.

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Hyde Bros. & Co., Pittsburg, Pa.
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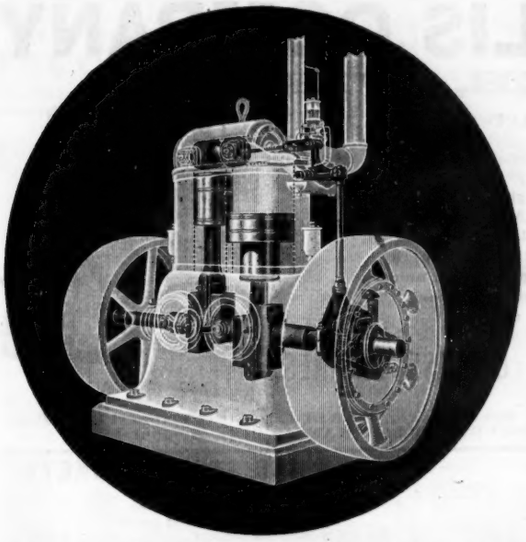
Armstrong Bros. Tool Co., Chicago, Ill.
The Pittsburg Gauge Co., Pittsburg, Pa.
George Place Machine Co., New York City.



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HAVANA, CUBA, May 18th, 1895.

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We have been able to shut down three boilers, and do not have to force the remaining ones at all.

The whole story is told in one word, "Perfection."

Yours truly,

SPANISH-AMERICAN LIGHT & POWER CO.

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Fox Machine Co., Grand Rapids, Mich.
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C. H. Besly & Co., Chicago, Ill.
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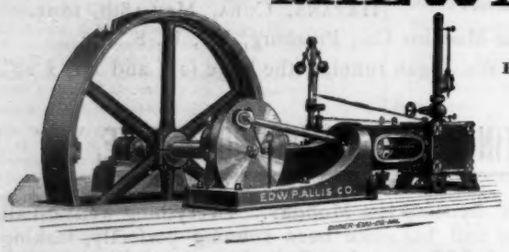
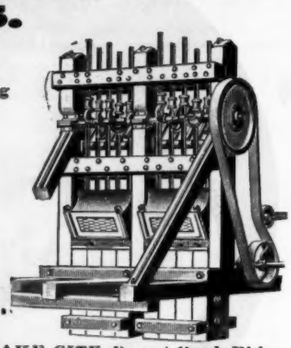
Cady Mfg. Co., Cleveland, O.

THE EDWARD P. ALLIS COMPANY
MILWAUKEE, WIS.



MANUFACTURERS OF

Blowing Engines, Hoisting Engines, Pumping Engines, Air Compressors, Special Engines for Electric Lighting, Street Railways and Rolling Mills, Ore Crushers, Crushing Rolls, Stamp Mills, Concentrators, General Mining, Milling and Smelting Machinery.



REYNOLDS PATENT VERTICAL BOILERS. REYNOLDS CORLISS ENGINES.

NEW YORK, Room 1111, Havemeyer Bldg. CHICAGO, Room 509, Home Ins. Bldg. MINNEAPOLIS, Room 416, Corn Exchange. DENVER, 1316 18th Street. SAN FRANCISCO, 31 Main Street. PITTSBURG, 702 German Nat'l Bank Bldg. SALT LAKE CITY, Desert Bank Bldg. KANSAS CITY, Armour Bldg.

Alphabetical List of Advertisers.

The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

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Westinghouse Machine Co.	30
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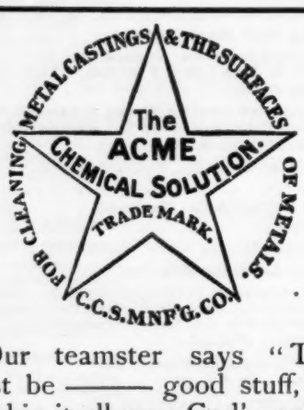
Wheeler Boiler Co.	32



Our teamster says "This must be ——— good stuff, for we ship it all over God's green earth, from H—— to Hackensack." He is right about it being "good stuff," for it will clean your castings of sand or scale, leaving them perfectly clean for plating, tinning, enamelling, galvanizing, etc., etc.

Chicago Chemical Solution Mfg. Co.

41 Lakeside Bldg., CHICAGO, ILL.

Subscribe for The IRON TRADE REVIEW.

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

No. 1 Specular, Bessemer	3.05@ 3.4
No. 1 Bessemer hematite	2.90@ 3.0
Hematites No. 1 non-Bessemer	2.00@ 2.2
No 1. Specular, non-Bessemer	2.35@ 2.7

PIG IRON.

CLEVELAND (f. o. b. cars):

Bessemer	$12 50@$12 65
No. 1 Strong Foundry	12 00@ 12 25
No. 2 Strong Foundry	11 00@ 11 40
No. 1 Gray Forge, red short	10 50@ 10 75
No. 2 Gray Forge, neutral	10 00@ 10 25
No. 1 American Scotch	00 00@ 12 15
No. 2 American Scotch	00 00@ 11 25
Lake Superior Charcoal	13 00@ 13 50

PITTSBURG:

No. 1 Foundry	$11 75@$12 25
No. 2 Foundry	10 75@ 11 25
Gray Forge	10 50@ 10 75
White and Mottled	10 00@ 10 25
Warm Blast Charcoal	16 00@ 17 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	12 50@ 12 65

CHICAGO (reported by our representative:)

Lake Superior Charcoal	$13 25@$13 75
Local Coke Foundry No. 1	11 75@ 12 00
Local Coke Foundry No. 2	11 25@ 11 50
Local Coke Foundry No. 3	11 00@ 11 25
Local Scotch Foundry No. 1	11 75@ 12 00
Local Scotch Foundry No. 2	11 25@ 11 50
Local Scotch Foundry No. 3	11 00@ 11 25
Southern Coke No. 1	10 75@ 11 00
Southern Coke No. 2	11 50@ 11 75
Southern Coke No. 3	11 25@ 11 50
Southern No. 1 Soft	11 50@ 11 75
Southern No. 2 Soft	11 25@ 11 50
Southern Silveries No. 1	12 75@ 13 00
Southern Silveries No. 2	12 25@ 12 50
Jackson Co. Silveries	15 00@ 16 00
Ohio Silveries No. 1	14 00@ 14 50
Ohio Silveries No. 2	13 00@ 13 50
Ohio Strong Softeners	13 00@ 13 50
Alabama Car Wheel	16 50@ 17 00
Malleable Bessemer	12 00@ 12 50
Coke Bessemer	12 00@ 12 50

CINCINNATI (reported by Rogers, Brown & Co.)

Southern Coke No. 1, Foundry	$11 00@$10 50
Southern Coke No. 2 and No. 1 Soft	10 50@ 10 00
Hanging Rock Coke, No 1	12 00@ 12 25
Hanging Rock Charcoal No. 1, Fdy	15 00@ 16 50
Tennessee Charcoal No 1	13 00 14 50
Jackson County Stone Coal No 1	14 00@ 14 50
Southern Coke, Gray Forge	10 00@
" " Mottled	9 50@ 10 00
Standard Alabama Car Wheel	15 00@ 16 00
Tennessee " "	14 50@ 15 00
Lake Superior " "	13 50@ 14 00

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	Gross Tons
Old iron rails	$14 50
Old steel rails	11 50
	Net Tons
No. 1 R. R. wrought scrap	$12 00
No. 1 wrought scrap	11 00
No. 1 Machine cast scrap	9 50
Iron axles	16 50
Axle turnings	8 50
Wrought turnings (free from cast)	8 00
Cast borings	7 00
Uncut wrought iron boilers	5 00
Steel boiler plates	9 50
Grate bars	6 50
Pipes and flues (clean)	8 00
Tank iron	8 75
Hoop and band iron	7 00
Sheet iron	7 00
Wrought drillings	8 00
Malleable iron	9 00

STRUCTURAL MATERIAL.

Beams and Channels (Cleveland mill)	1.40c@1.45c
Angles	1.30c@1.35c
Tees	1.45c@1.50c
Universal Plates	1.35c
Sheared Plates	1.45c

MERCHANT IRON AND STEEL.

[List prices out of store.]

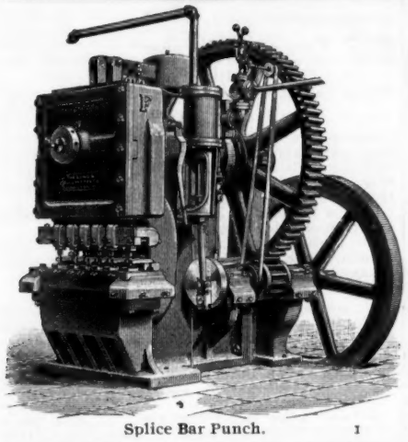
Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 25
4½ to 6 by ⅜ to 1 inch	1 30
1½ to 6 by 1⅛ to 2 inch	1 45
1¼ & 1⅜ by ⅜ to ¾ inch	1 30
1 & 1⅛ by ⅜ to ¾ inch	1 35
⅝, ¾, ⅞, by ⅜ to ⅞ inch	1 45

Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.
THE CADY MFG. CO.
18, 20 and 22 Johnson St., CLEVELAND, O.

SEND FOR OUR NEW CATALOGUE OF Power Presses, Drop Hammers, Punches and Shears, Wire Working and Special Machinery.

PERFORATED METALS
OF ALL KINDS FOR
MILLING MINING AND AGRICULTURAL MACHINERY,
PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.
LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.
THE ROBERT AITCHISON. PERFORATED METAL CO.,
OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.


Splice Bar Punch. 1

—THE—
Long & Allstatter Co.
HAMILTON, O., U. S. A.
Manufacturers of Belt, Steam and Electrically driven
POWER PUNCHES and SHEARS,
for all kinds of Boiler, Tank and Structural Iron Work, Rolling Mills, Locomotive Shops, Car and Wagon Shops, Plow Shops, etc. Send for Catalogue.

A. H. LEITCH, PREST. JOHN C. LEITCH, SEC. AND TREAS.
WESTMORELAND FIRE BRICK CO.
MANUFACTURERS OF HIGH GRADE **FIRE BRICKS.**
PITTSBURG, PA.
Works and Mines, Westmoreland, Pa.

PL DIXON'S PERFECT LUBRICATING GRAPHITE.
The most Marvelous Lubricant Known.
Used Dry, or Mixed with Water, Oil or Grease.
NOT AFFECTED BY HEAT, COLD, STEAM OR ACIDS.
An Interesting and Instructive Pamphlet will be sent Free of Charge.
JOS. DIXON CRUCIBLE CO. Jersey City, N. J.

IRON CLAD PAINT CO.
Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.
CLEVELAND, OHIO.

Trade Mark Patented.

ORDER DIRECT FROM THE
Iron Clad Paint Co.
And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.
IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.
FURNISHED both Dry and Ground in Oil
USED BY NEARLY ALL THE RAILROADS.

Round and Square.

1 to 1⅞ inch	1 25
2 to 2⅝ inch	1 45
2¾ to 3¾ inch	1 40
3⅞ to 4 inch	1 75
4⅛ to 4½ inch	2 35
4¾ to 5 inch	2 55

Oval.

⅜ to 1¼ inch	1 45
⅜ to ¾ inch	1 45
½	1 65
⅝	1 85

Half Oval and Half Round.

1½ to 3 inch	1 80
⅜ to 1½ inch	1 60
⅜ to ¾ inch	1 85
½	2 00
⅝	3 10

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 35
1 to 1¾ by ¼ and 5-16 inch	1 40
¾ to ⅞ by ¼ and 5-16 inch	1 50
½ to ⅝ by ¼ and 5-16 inch	1 75

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 80
1 7-16 to 2, No. 17, 18 and 19	1 85
1 7-16 to 2, No. 20	1 95
1 7-16 to 2, No. 21	2 05
1 7-16 to 2, No. 22	2 15
1¼ to 1⅜, No. 13, 14 and 15	1 85
1¼ to 1⅜, No. 16, 17 and 18	1 90
1¼ to 1⅜, No 19 and 20	1 95
1¼ to 1⅜, No. 21	2 05
1¼ to 1⅜, No. 22	2 15
15-16 and 1 inch, No. 13, 14 and 15	1 80
15-16 and 1 inch, No. 16, 17 and 18	1 95
15-16 and 1 inch, No. 19 and 20	2 05
15-16 and 1 inch, No. 21	2 15
15-16 and 1 inch, No. 22	2 25
⅞, No. 13, 14 and 15	2 05
⅞, No. 16, 17 and 18	2 15
⅞, No. 19 and 20	2 25
⅞, No. 21	2 35
⅞, No. 22	2 45
13-16, No. 13, 14 and 15	2 15
13-16, No. 16, 17 and 18	2 25
13-16, No. 19 and 20	2 35
13-16, No. 21	2 45
13-16, No. 22	2 55
¾, No. 13, 14 and 15	2 25
¾, No. 16, 17 and 18	2 40
¾, No. 19 and 20	2 50
¾, No. 21	2 60
¾, No. 22	2 70
11-16, No. 13, 14 and 15	2 50
11-16, No. 16, 17 and 18	2 55
11-16, No. 19 and 20	2 65
11-16, No. 21	2 75
11-16, No. 22	2 85
11-16, No. 23	2 95
⅞, No. 13, and 15	2 55
⅞, No. 16, 17 and 18	2 65
⅞, No. 19 and 20	2 75
⅞, No. 21	2 85
⅞, No. 22	2 95
⅞, No. 23	3 05
9-16, No. 13, 14 and 15	2 75
9-16, No. 16, 17 and 18	2 85
9-16, No. and 20	2 95
9-16, No. 21	3 05
9-16, No. 22	3 15
9-16, No. 23	3 25
7-16 and ½ inch, No. 13, 14 and 15	2 95
7-16 and ½ inch, No. 16, 17 and 18	3 05
7-16 and ½ inch, No. 19 and 20	3 15
7-16 and ½ inch, No. 21	3 25
7-16 and ½ inch, No. 22	3 35
7-16 and ½ inch, No. 23	3 45
⅜, No. 13, 14 and 15	3 45
⅜, No. 16, 17 and 18	3 55
⅜, No. 19 and 20	3 65
⅜, No. 21	4 96
⅜, No. 22	4 05
⅜, No. 23	4 20

Light Band.

1½ to 6 by ⅛ to 3-16 inch	1 55
1¼ to 6 by Nos. 11 and 12	1 60
1 to 1⅜ by ⅛ to 3-16 inch	1 60
1 to 1⅜ by Nos. 11 and 12	1 65
⅞ and 13-16 by ⅛ to 3-16 inch	1 75
⅞ and 13-16 by Nos. 11 and 12	1 85
¾ and 11-16 by ⅛ to 3-16 inch	1 85
¾ and 11-16 by Nos. 11 and 12	1 90
⅝ and 9-16 by ⅛ to 3-16 inch	2 00
⅝ and 9-16 by Nos. 11 and 12	2 05
½ by ⅜ to 3-16 inch	2 15
¼ by Nos. 11 and 12	2 20

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	1 75
⅞ inch, " " " " 13 and 14	1 85
¾ inch, " " " " 11 and 12	1 90
¾ inch, " " " " 13 and 14	1 20

Sheet Iron.

No. 10	1 85
No. 12	1 95
No. 14	2 00
No. 15-17	2 10
No. 18	2 25
No. 20	2 40
No. 22-24	2 50
No. 25-26	2 60
No 27	2 70

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 65
Shell	1 85
Flange	1 95
Marine Flange	2 25
Fire Box	3 15

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	68
9-16 to ½ in. "	08½

—FOR—
JESSOP'S STEEL Tools, Drills, Dies, etc.
Established over a Century ago. Manufactory, SHEFFIELD, ENGLAND.
CHIEF AMERICAN OFFICE, 91 JOHN ST., NEW YORK.
WM. JESSOP & SONS, Limited.
"Medal—World's Columbian Exposition, 1893."
All sizes carried in stock by The W. Bingham Co., Cleveland, Ohio.

HOISTING MACHINERY for Mining, Quarrying, Coal Handling, Pile Driving, Bridge Building, Log Hauling, and for general Contractors' Use. Improved Electric Hoists, single and double Patent Friction Drum, compound, geared with brakes and reversible for general Hoisting, Mining Purposes and Suspension Cable Ways.

Send for Illustrated Catalogue giving full description, etc.

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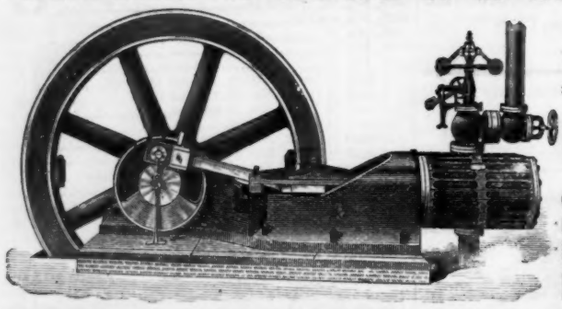
Salesrooms 143 Liberty st., N. Y. 117-123 POINIER ST., NEWARK, N. J.

C. W. HUNT COMPANY,
45 Broadway, New York,
MANUFACTURERS OF
HOISTING AND CONVEYING MACHINERY
For moving all kinds of material in Steam Power Stations, Factories, Gas Works. Mines, Coal Yards, etc.
Tip Cars, Wire Rope, Barrows.
INDUSTRIAL RAILWAYS.

THE HUNT TIP CAR.

TOTTEN & HOGG I. & S. F'DRY CO.
Manufacturers of
The "Ætna" Rolling Mill
ENGINE,
Chilled and Sand Rolls and Rolling Mill Machinery.
Pittsburg, Pa.



FIRE DOVER FIRE BRICK CO., MANUFACTURERS OF Furnace, Mill and Special Shape Fire Brick Office, 44 Mercantile Bank Bldg., CLEVELAND, OHIO. **BRICK**

The Most Satisfactory Fire Brick That Money can Buy
Our well known brands
"O. K." Crown, "O. K." and "A"
They have no equal when used for the purpose designated. They are good, honest, well made Brick, made to hold your trade.
HOLMES, STRACHAN & CO., Agents, Detroit, Mich.
Oak Hill Fire Brick & Coal Co., Manufacturers, OAK HILL, OHIO.

7-16 to ⅝ and 2⅜ to 3 in.	09
3⅛ to 4 in.	09½
⅜ to 11-16 and 4⅛	10
⅛ to 6 in.	10½
¼ to 9-32 and 6⅛ to 7 in.	11
7 in	13

Flats.

	cts. ℔s.
2 to 9-16 in. wide by 2 to ⅝ thick	8

Bessemer and O. H. Steel.

Machinery	base price,	1 60
Tire	"	1 70
Spring	"	2 20
Sleigh Shoe	"	2 10
Toe Calk	"	2 15
Cutter Shoes, tapered and bent	"	2 20

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 30
Bridge ½, ⅝, 11-16 and ¾ inch diam.	3 00

Wrought Pipe and Boiler Tubes.

Lap weld black, base	dis. 75, 10 and 10
Butt " " "	dis. 67¾, 10 and 10
Lap " galv. "	dis. 65, 10 and 10
Butt " " "	dis. 62, 10 and 10
Boiler tubes 1¼" and smaller,	dis 72½ and 5
Boiler tubes 2½" and larger	dis. 75 and 5
Casing screw and socket joint	dis. 60
Casing inserted joint	dis. 55

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ 9@10
Wright's	℔ 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis35
Horton's Universal	dis40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	℔ 3½
Iron, steel points	℔ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	Flour, C. F F. FF.
Kegs, ℔	4½c	5 c	2½c
½ kegs ℔	4¾c	5¼c	2¾c
¼ kegs ℔	5 c	5½c	3 c
10 ℔ cans, 10 in case	6 c	6½c	5 c
10 ℔ cans less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 60@70
Norton's	dis 60@70
Grant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

SHIFFLER BRIDGE COMPANY,

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* Daily. † Daily, except Sunday.

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Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	† 3:25 pm	† 9:50 am
Hudson and Ravenna	* 5:00 pm	* 8:25 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:40 am	* 5:15 pm
Akron and Columbus	* 8:40 am	*5:15 pm
Akron, Columbus & Zanesville	†12:45 pm	†12:10 pm
Akron and Orrville	† 3:25 pm	† 9.50 am
Columbus and Cincinnati	* 8:00 pm	* 6:55 am

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	Arrive.	Depart.
Akron & Canton	*6:30 P M	*7:10 A M
Akron, Canton & Valley Jctn.	*10:10 A M	*3:15 P M
Valley Jctn. & Way Stations	†6:30 P M	†7:10 A M
Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Chicago	†2:45 P M	†11:00 A M
Wooster	.....	†6:30 P M
Akron, Canton & Marietta	†2:45 P M	†11:00 A M
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Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&12
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	12c
" " " over 5 lbs	10c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15½	11½	8½	6	5⅛	5¼	
Washers	9	8	7	5	4½	4½	4⅛

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 85
Standard Penny Nails, ₩ keg card rate	
{ Car lots	$1.25
{ Less than car lots	$1.35

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz	dis 10@10&10

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 50
Medart Pulleys	dis 50
Split Wood Pulleys	dis 55@60

Pulley Blocks.

Moore's Anti-Friction Differential Chain Pulley Block	dis 20

Rivets.

Iron, Thousand, list November 1, 1894	dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894	dis 60@65
Copper	dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

New List, Apr. 9, 1894

Brass	dis 40
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ₩ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis

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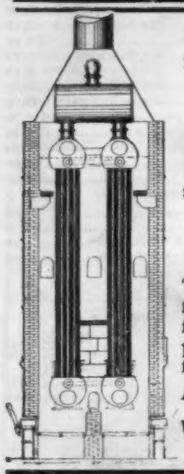

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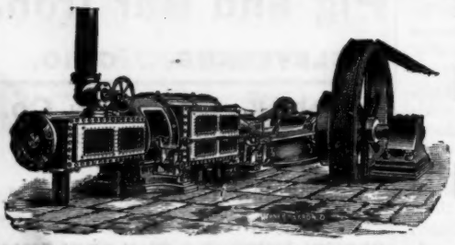

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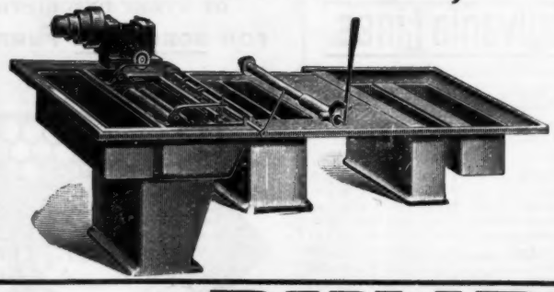

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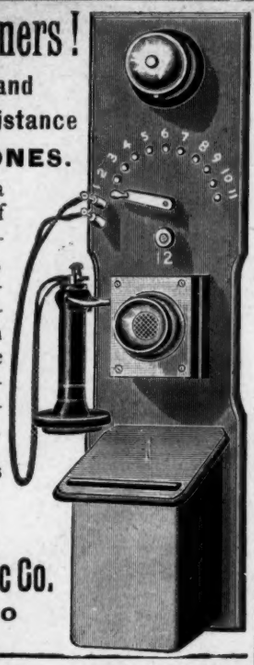

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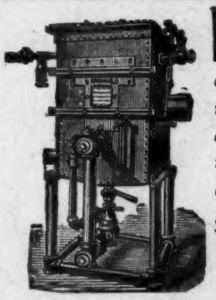

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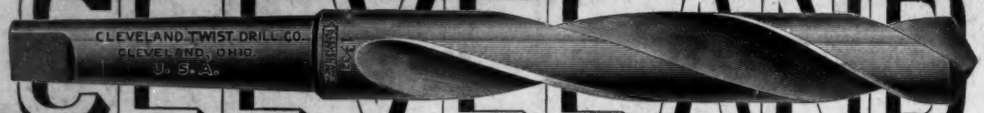

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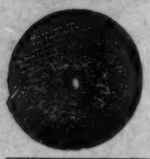

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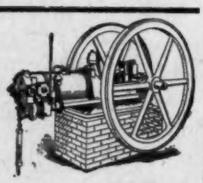

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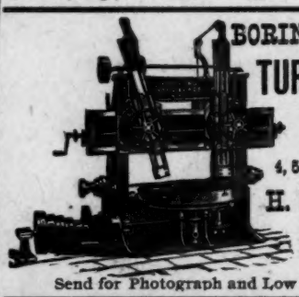

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